

MISSISSIPPI RIVER FROM CAPE GIRARDEAU, MO., TO
ROCK ISLAND, ILL.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON
EXAMINATION OF THE MISSISSIPPI RIVER FROM CAPE GIRAR-
DEAU, MO., TO ROCK ISLAND, ILL., WITH A VIEW TO SUCH
IMPROVEMENTS AS WILL AT THE SAME TIME PROMOTE NAVI-
GATION, DEVELOP WATER POWER, AND PROTECT PROPERTY
ADJACENT TO SAID RIVER FROM DAMAGE BY FLOODS, CONSID-
ERATION BEING GIVEN TO PLANS FOR COOPERATION BY THE
LOCALITIES AFFECTED, ETC.

JANUARY 22, 1914.—Referred to the Committee on Rivers and Harbors and ordered
to be printed, with illustrations.

WAR DEPARTMENT,
Washington, January 22, 1914.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Act-
ing Chief of Engineers, United States Army of this date, together
with copy of report from the Mississippi River Commission dated
December 19, 1913, with maps, on examination of the Mississippi
River from Cape Girardeau, Mo., to Rock Island, Ill., made in com-
pliance with the provisions of the river and harbor act approved
March 4, 1913.

Very respectfully,

LINDLEY M. GARRISON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 22, 1914.

From: The Chief of Engineers, United States Army.

To: The Secretary of War.

Subject: Examination of Mississippi River from Cape Girardeau Mo., to Rock Island, Ill.

1. There is submitted herewith, for transmission to Congress, report dated December 19, 1913, with maps, by the Mississippi River Commission, on examination of the Mississippi River from Cape Girardeau, Mo., to Rock Island, Ill., authorized by the following item contained in section 1 of the river and harbor act approved March 4, 1913:

The Mississippi River Commission shall make an examination of the Mississippi River from Cape Girardeau, Missouri, to Rock Island, Illinois, with a view to such improvements as will at the same time promote navigation, develop water power, and protect property adjacent to said river from damage by floods; and in making such examination consideration shall be given and recommendations made as to plans for cooperation by the localities affected; and for the purpose of such examination and for the building of such levees between said points upon the river in aid of navigation, as may be found necessary or desirable by the commission and approved by the Chief of Engineers, the sum of \$200,000 is hereby appropriated.

2. Work for the improvement of the navigation of this portion of the Mississippi River has been in progress for many years, the original project for the stretch from Rock Island to the mouth of the Missouri having been adopted in 1879, and that from the mouth of the Missouri to Cape Girardeau in 1872. The existing project for the upper section provides for obtaining a depth of 6 feet at low water by contracting the low-water channel to a width of 1,000 feet at Rock Island, gradually increasing to 1,400 feet at the mouth of the Missouri by means of wing dams and shore protection. In the portion of the river between the mouth of the Missouri and Cairo the existing project contemplates attaining a depth of 6 feet above St. Louis and 8 feet below by contracting the low-water channel by means of permeable dikes and bank revetment. The commission states that while the General Government has been improving the navigation of the upper river and a private corporation has developed water power, the people residing along the river banks have also constructed levees to protect their lands from overflow, and there have been created 52 levee and drainage districts between Cape Girardeau and Rock Island. The levees are in various condition of efficiency and stages of construction, and most of them are deficient in both grade and section, and do not appear adequate to control the great floods that occur at long intervals in this portion of the river.

3. The commission points out that the proviso that the project to be considered "shall at the same time promote navigation, develop water power, and protect property adjacent to said river from damage by floods" presents great difficulties, as the objects to be attained can not in all cases be advantageously or economically combined. On the portion of the river under consideration the only locality where power structures could be economically built is at Keokuk, Iowa, which is occupied by a private company under congressional enactment. On other sections the slope is relatively gentle, and suitable foundations for dams can be found only at considerable

depths. Dams constructed for power purposes under such conditions are not only expensive in proportion to the power developed but largely increase flood heights. For these and other reasons explained, the commission reports that a further development of water power in the Mississippi River from Cape Girardeau to Rock Island is not commercially feasible; that the low-water navigation of the river can be improved under the projects which have heretofore received congressional approval, and property adjacent to the river can be protected from damage by floods by a system of levees. While levees are not necessary for the development of an adequate low-water channel, they serve a useful purpose in preventing the overflow of the river banks, and thereby promote and facilitate commerce. The commission recommends that the following allotments, or so much thereof as may be necessary, be made from the funds appropriated by the act for this purpose, subject to the decision of the proper authorities as to the legality of the proposed expenditures:

Muscatine to Port Louisa, Iowa.....	\$10,000
Warsaw to Quincy, Ill.....	20,000
Wagrange to mouth of Missouri River, Mo.....	30,000
Quincy to Hamburg Bay, Ill.....	60,000
Head of Chouteau Island to Prairie du Pont, Ill.....	60,000
Grand Tower to near Thebes, Ill.....	10,000
Total.....	190,000

In the opinion of the commission, the expenditures already made by the several reclamation districts establishes their cooperation in the improvement.

4. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated January 14, 1914, concurring in the commendations of the Mississippi River Commission.

5. After due consideration of the above-mentioned reports, I concur generally with the views of the Mississippi River Commission and the Board of Engineers for Rivers and Harbors. Under the authority conferred by the item of law ordering this investigation, allotments for the work will be made and apportioned in the manner above indicated.

EDW. BURR,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

[Second indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
January 14, 1914.

THE CHIEF OF ENGINEERS, UNITED STATES ARMY:

The board concurs in the recommendations of the Mississippi River Commission.

W. M. BLACK,
Colonel, Corps of Engineers,
Senior Member of the Board.

EXAMINATION OF MISSISSIPPI RIVER FROM CAPE GIRARDEAU, MO.
TO ROCK ISLAND, ILL.

MISSISSIPPI RIVER COMMISSION,
OFFICE OF THE PRESIDENT,
St. Louis, Mo., December 19, 1913.

From: The Mississippi River Commission.

To: The Chief of Engineers, United States Army.

Subject: The Mississippi River between Cape Girardeau, Mo., and Rock Island, Ill.

1. The following report and recommendations of the Mississippi River Commission relative to the Mississippi River between Cape Girardeau, Mo., and Rock Island, Ill., are made in compliance with that section of the river and harbor act approved March 4, 1911, which states:

The Mississippi River Commission shall make an examination of the Mississippi River from Cape Girardeau, Missouri, to Rock Island, Illinois, with a view to such improvements as will at the same time promote navigation, develop water power, and protect property adjacent to said river from damage by floods; and in making such examination consideration shall be given and recommendations made as to plans of cooperation by the localities affected; and for the purpose of such examination for the building of such levees between said points upon the river in aid of navigation as may be found necessary or desirable by the commission and approved by the Chief of Engineers, the sum of \$200,000 is hereby appropriated.

2. The examinations called for therein have been made under the direction of the Secretary, and the commission itself, on November 10-14, 1913, also examined the portion of the river described in the act. Numerous hearings were held to ascertain the views of the people as to the improvements needed or desired in their respective localities.

3. The physical characteristics of the portion of the river under consideration differ materially above and below the mouth of the Missouri River. The upper reaches of the Mississippi River carry little sediment, even at extreme flood stages, when compared with those below. Except through the Rock Island and Des Moines Rapids, its slope is gentle, averaging about four-tenths of a foot per mile. At Rock Island the extreme range in stage between 1872 and 1912 was 20.5 feet, while the average flood stage for the entire period of 41 years is 12.5 feet, and only five years in that period show stage above 15 feet. The bank-full stage occurs at about 12 feet on the Rock Island gauge. Overflow conditions are comparatively rare and levee construction for flood control requires embankments of moderate height and section.

4. The Missouri River brings into the Mississippi large amounts of sediment at all stages, and below its mouth the regimen of the river markedly changes. Its average slope is increased to about six or eight one-hundredths of a foot per mile. At St. Louis, for the period of 41 years, the maximum oscillation between high and low water has been 40.5 feet; the average flood stage has been 22.4 feet on the St. Louis gauge, and for 28 years during that period the high water stage did not reach danger line.

5. At Cairo, Ill., the discharge of the Ohio produces a further radical change in conditions. The maximum oscillation between high and low water is 54.7 feet, and the average flood stage 45 feet. As the overflow stage in this vicinity is about 42 feet on the Cairo

gauge, it will be seen that the average flood stage is above danger line, which was reached in 29 years out of the 41 years under consideration, while there were only 12 years during that period in which overflows did not occur.

6. This marked difference in the frequency of overflow in the upper Mississippi Valley and the lower Mississippi Delta should receive consideration, both as a question of protection of "property from damage by floods" and the influence of levees in the improvement of navigation.

7. Work for the improvement of the navigation of this portion of the river has been in progress for many years, the original project for the stretch of river from Rock Island to the mouth of the Missouri having been adopted in 1879, and that from the mouth of the Missouri to Cape Girardeau in 1872. The existing project, for the upper section, provides for obtaining a depth of 6 feet at low water by contracting the low-water channel to a width of 1,000 feet at Rock Island, gradually increasing to 1,400 feet at the mouth of the Missouri, by means of wing dams and shore protection. The wing dams are built of brush and stone, and extend to a height of only about 6 feet above low water; similar structures are used for closing chutes.

8. In the original project the Des Moines Rapids was surmounted by means of a lateral canal, but by act of February 9, 1905, Congress authorized the Mississippi River Power Co. to construct a dam across the river at Keokuk, Iowa, for power purposes. The crest of this dam has an elevation of 35 feet above standard low water, and creates a lake above it extending above Burlington, Iowa, a distance of about 60 miles, and for this portion of the river canalization has been substituted for the method of improvement by regulation adopted for the remainder of the stream.

9. It is to be noted that the adopted project contemplates obtaining low-water channel of 6 feet depth by utilizing the currents which exist at low stages, no attempt being made to restrain the flow of the river above a reading of 6 feet on the gauge.

10. In the portion of the river between the mouth of the Missouri and Cairo, the existing project adopted in 1881 also contemplates obtaining a depth of 6 feet above St. Louis and 8 feet below, by contracting the low-water channel by means of permeable dikes and bank revetment.

11. Due to the large amount of sediment brought into the main river from the Missouri, and which is readily deposited behind the permeable dikes, the new banks have been built up to a height of from 18 to 20 feet on the gauge. Chutes have also been closed to the same height.

12. Prior to the adoption of the existing project, efforts were made to utilize the flood discharge in deepening the low-water channel in the vicinity of St. Louis, by straightening the channel, so that the maximum currents during high and low water would follow the same channels. By this means the projected channel depths were readily obtained, but it was found that the low-water slopes were also reduced, injuriously affecting the river above, and in recent years the river contraction has followed more closely the natural windings of the stream during low water, permitting the river currents above mid stage to flow without attempt at control.

13. There had been expended by the General Government on the portion of the river from Rock Island to the mouth of the Missouri, for the improvement of its navigation, over \$5,700,000 to June 30, 1912, and from the mouth of the Missouri to Cairo, \$13,978,621.40.

14. The project adopted by the Mississippi River Commission for the improvement of the river from Cairo to Head of Passes differs materially from the projects adopted for the improvement of the upper river. The organic act creating the Mississippi River Commission states:

SEC. 4. It shall be the duty of said commission to take into consideration and mature such plan or plans and estimates as will correct, permanently locate, and deepen the channel and protect the banks of the Mississippi River; improve and give safety and ease to the navigation thereof; prevent destructive floods; promote and facilitate commerce, trade, and the Postal Service.

15. As work on the upper river was already under way, the commission confined its first project to the river below Cairo, and in conformity with the instructions of Congress cited, formulated plan which "contemplated the permanent location and deepening of the channel by the contraction of the low-water width where necessary, the protection of the banks against caving, and the control of the flood waters by means of levees. The works designed primarily for the rectification and improvement of the channel have been confined to the Plum Point reach, 147 to 186 miles, and Lake Providence reach, 517 to 552 miles below Cairo. These reaches were selected because here the shifting sand bars and deficient depths were the most pronounced and the low-water navigation was the most difficult. Highly beneficial results were obtained in the improvement of the channel depths in those reaches, and the work done in them confirmed the soundness of the theory upon which it was based but also demonstrated that the permanent improvement of the channel by contraction and revetment works would necessarily consume a long period of time, while the present needs of commerce called for immediate relief."

16. To meet this necessity, temporary relief by means of hydraulic dredges was resorted to in lieu of the contraction works.

17. The commission also stated that levees "are, in connection with an equalization of width and the prevention of caving, an important part of any general and systematic plan for the improvement of navigation and the prevention of destructive floods."

18. The work of the commission is carried on under the project described, which has the approval of Congress.

19. While the General Government has been improving the navigation of the upper river, as above described, and a private corporation has developed water power, the people residing along the river banks have also constructed levees to protect their lands from overflow.

20. There have been created 52 levee and drainage districts between Cape Girardeau and Rock Island, of which 30 are in Illinois, 6 in Iowa, and 16 in Missouri. Levees have been built in 26 of the districts and are under construction in 8; 10 districts are in process of organization, and in the remaining 8 districts levee construction is of doubtful practicability.

21. Illinois has about 216 miles of leveed river front out of the total river distance of 455 miles from Cape Girardeau to Rock Island; Iowa

has 50 miles and Missouri 34 miles, a total of 300 miles. These levees are in various conditions of efficiency and stages of construction, and most of them are deficient in both grade and section, and do not appear adequate to control the great floods that occur at long intervals in this portion of the river.

22. The total yardage in the existing levee line is 16,303,615, which at an estimated cost \$2,681,807. The additional yardage estimated as necessary to complete the levee line to 3 feet above the highest flood is 28,643,010, at an estimated cost of \$6,234,582. The area which will be protected by these levees is 782,379 acres, and its estimated value \$121,384,005.

23. Under existing conditions, the proviso that the project to be considered by the commission "shall at the same time promote navigation, develop water power, and protect property adjacent to said river from damage by floods," presents great difficulties. To create power necessitates the development of a considerable head of water at a given locality. This is usually accomplished by constructing a dam, or when there exist falls or rapids, by a lateral canal along the river bank. On the portion of the river under consideration, the only locality where such structures could be economically built is at Keokuk, Iowa, which has been occupied by the Mississippi River Power Co. under congressional enactment. On other sections, the slope is relatively gentle, and suitable foundations for dams can only be found at considerable depths. Dams constructed for power purposes under such conditions, are not only expensive in proportion to the power developed, but largely increase flood heights. In the thickly settled regions in the neighborhood of St. Louis, with its large manufacturing plants and immense railroad interests, a material increase in flood heights can not be permitted.

24. It has been proposed to lessen the flood effects of constructing power dams by widening the river above the dams, and lowering the river bed below them; such a project, to be effective, would require such an enormous excavation as to preclude the possibility of water power being developed at a cost which would enable it to compete with power developed from fuel, in a locality where coal is mined and delivered as cheaply as near St. Louis. The large amount of sediment carried into the Mississippi from the Missouri would soon fill the pools formed by such dams, and restore existing slopes, unless a system of river regulation and contraction similar to that of the existing project was also introduced.

25. The projects which have already received the approval of Congress will, when completed, afford adequate facilities for existing navigation. Large expenditures have been made upon them, and levees are not essential to the development of the channel depth contemplated, as is evidenced by the results already achieved.

26. The commission has therefore to report that a further development of water power in the Mississippi River from Cape Girardeau, Mo., to Rock Island, Ill., is not commercially feasible, and that the low-water navigation of the river can be improved under the projects which have heretofore received congressional approval, and property adjacent to the river can be protected from damage by floods by a system of levees, but they are not necessary for the development of an adequate low-water channel.

27. The utility of levees in connection with the improvement of the river has, however, a broader significance than the mere effect on channel depths. Landing places and facilities for the interchange of traffic during periods of flood are essential to successful navigation, and levees serve a useful purpose in preventing the overflow of the river banks, and to a very material extent serve to "promote and facilitate commerce, trade, and the postal service." Consideration of this phase of the improvement of the river is required by the organic act creating the commission.

28. An appropriation for the benefit of the people should receive liberal construction, and as levees, as explained above, are desirable aids to navigation during flood stages, the commission submits allotments of the funds appropriated, based on the following considerations:

29. In order to materially benefit navigation, the levees along the river front should be continuous for several miles. Back levees extending from the river to the hills, or along the hills, for the purpose of diverting the drainage, are not considered as beneficial to navigation.

30. It seems evident from the description of the districts given herein, and the terms of the act, that certain further elimination should be made in consideration of the question of allotments of funds, viz:

(a) Proposed levee districts, where levee construction has not been commenced, and districts without taxing powers, which would prevent them from contributing a fair share toward the work.

(b) Districts requesting merely that the Government take over the preservation and future care of their levees.

(c) Districts with but small frontage on the river, and therefore having little, if any, influence on navigation, the reclamation of which requires large expenditures for flood protection from tributary streams and drains, rather than from the main river.

(d) Districts in which the levees have been recently completed and require no additional expenditures at this time.

(e) Districts where levees for flood control have already been built with Government funds without local aid for either construction or maintenance.

(f) Districts where contracts have already been made for the complete levee protection and funds are already provided for the payment thereof by taxes.

(g) Districts whose areas are too small to justify the cost of flood protection and reclamation.

31. Even with these eliminations, the funds available will only partly meet the legitimate requirements of the districts which, under the terms of the law, may be regarded as meritorious.

32. The larger basins, where large expenditures of money have been made by the local beneficiaries and where important interests measured by their magnitude, are jeopardized by floods, would seem to be first entitled to the cooperation and aid of the Government.

33. The commission therefore recommends that the following allotments, or so much thereof as may be necessary, be made, which in its opinion, are just and equitable, and are as advantageously distributed as the funds available will permit:

Muscatine to Port Louisa, Iowa.....	\$10,000
Warsaw to Quincy, Ill.....	20,000
Lagrange to mouth of Missouri River, Mo.....	30,000
Quincy to Hamburg Bay, Ill.....	60,000
Head of Chouteau Island to Prairie du Pont, Ill.....	60,000
Grand Tower to near Thebes, Ill.....	10,000
Total.....	190,000

34. With reference to the "plans for cooperation by the localities affected," required by the act, it is recommended that the funds allotted be applied to the specific work of construction, repair, and enlargement of levees at such localities in the districts named as will best serve the purpose of the improvement of navigation and the protection from damage by floods. The several districts having already expended considerable sums for like purposes, establishes their cooperation for the purposes named.

35. The commission is in doubt as to the true intent of Congress in the act under consideration, and submits these recommendations subject to the decision of the proper authorities as to the legality of the proposed expenditures for the purposes named.

36. For further details concerning the several levee districts, see the report of Maj. W. B. Ladue, Corps of Engineers, United States Army, Acting Secretary, abstracts of hearings, and maps, submitted herewith.

C. McD. TOWNSEND,
Colonel, Corps of Engineers, U. S. Army,
President, Mississippi River Commission.

ROBT. S. TAYLOR.

J. A. OCKERSON.

HOMER P. RITTER,
Assistant, U. S. Coast and Geodetic Survey.

J. G. WARREN,
Colonel, Corps of Engineers, U. S. Army.

C. H. WEST.

LANSING H. BEACH,
Colonel, Corps of Engineers, U. S. Army.

[For report of Board of Engineers for Rivers and Harbors, see p. 3.]

Status of levees, etc., in the levee and drainage districts along the Mississippi River between Cape Girardeau, Mo., and Rock Island, Ill.

[Prepared under the direction of the secretary Mississippi River Commission, November, 1913.]

Name of district.	Location (miles above Cairo).	Bank.	Work built, under construction, or proposed by local boards.				Additional work re- quired to raise le- vees 3 feet above highest water since 1863.			Area protected.	
			Levees.		Other work.	Total cost.	Status.	Levees.		Acres.	Estimated value.
			Top of levee above highest water since 1863.	Yardage.	Cost.			Yards. ¹	Cost. ²		
East Cape Girardeau and Clear Creek levee and drainage dis- trict.	47.5-60.5	L.	+3	338,645	\$43,516	\$43,516	Built.....	57,000	\$11,400	9,392	\$751,500
North Alexander County drainage district.	47.5-60.5	L.	.....	.....	.....	.....	Proposed.....	.....	.....	4,500	360,000
Clear Creek drainage and levee district.	59 -69	L.	+3	556,590	72,357	.....	do.....	47,000	9,400	20,000	1,600,000
Preston levee and drainage dis- trict.	68.5-81.5	L.	+3	.....	.....	135,000	Underconstruction	56,400	11,280	14,743	737,150
Grand Tower drainage and levee district.	79 -83	L.	0	57,800	8,092	.....	Built.....	.....	.....	2,640	184,800
Do .....	.....	.....	.....	.....	.....	.....	.....	194,000	38,800	.....	.....
Degonia and Fountain Bluff drainage and levee district.	79 -84 89 -104	L. L.	+3 +4	493,518	69,092	.....	Provisional Under construction	29,000	5,800	29,693	2,050,500
Levee district No.2. Perry County, Mo.	103 -112.5	R.	-1.5	100,000	15,000	(?)	Partly under con- struction.	511,000	102,200	12,000	990,000
Levee district No.1, Perry County, Mo.	112.5-117	R.	0	(?)	(?)	(?)	do.....	56,400	11,280	8,500	850,000
Kaskaskia Island sanitary and levee district.	117.5-124.5	R.	+9	1,704,500	152,493	167,493	Proposed.....	671,000	134,200	25,000	3,125,000
Okaw River to Prairie du Rocher. Levee and drainage district No.5..	125.5-140 137.5-152	L. L.	+3 +2	.....	.....	.....	Provisional Built.....	168,000 69,000	131,600 13,800	6,900	617,500
Stringtown levee and drainage district No.4.	141.5-147	L.	+2	155,655	23,348	(?)	do.....	72,600	14,520	2,795	153,725
Moredock and Ivy Landing drain- age district No.1.	150 -164	L.	(3)	.....	.....	(?)	.....do.....	.....	.....	5,000	250,000
Harrisonville and Ivy Landing levee and drainage district No.2.	150 -173	L	+1	546,000	65,520	(?)	do.....	143,000	28,600	20,000	1,000,000
Columbia drainage and levee dis-	163 -179.5	L.	0	592,000	71,040	(?)	do.....	515,000	103,000	12,800	768,000

Status of levees, etc., in the levee and drainage districts along the Mississippi River between Cape Girardeau, Mo., and Rock Island, Ill.—Continued.

Name of district.	Location, miles above Cairo.	Bank	Work built, under construction, or proposed by local boards.					Additional work re- quired to raise le- vees 3 feet above highest water since 1863.	Area protected.		
			Levees.		Other work.	Total cost.	Status.				
			Top of levee above highest water since 1863.	Yardage.						Cost.	
											Yards.	Cost.
Territory Fort Madison to Bur- lington, Iowa.	409 -423	R.	+3	671,716	\$134,343	.....	Problematical.....	1,786,000	\$357,200	.....	.....
Overflowed land between Dallas, Ill., and Pinkham Slough.	415 -425	L.	+3	759,000	106,260	\$15,026	Prohibitive.....	1,080,400	216,080	3,000	.....
Henderson County drainage dis- trict No. 2.	425 -427.5	L.	+4	155,700	26,560	142,860	Main levee built...	110,800	22,160	7,380	\$442,800
Henderson County drainage dis- trict No. 1.	427.5-436	L.	+3	821,400	96,200	146,800	Under construc- tion.	244,000	48,800	7,680	460,800
Henderson County drainage dis- trict No. 3.	436 -440	L.	+3	390,500	54,670	.....	Proposed.....	23,000	4,600	2,780	159,580
Flint Creek-Iowa River levee district No. 16.	430 -460	R.	+3	1,856,351	296,957	(¹)	Built—\$300,000 contributed by United States.	703,600	140,720	44,722	4,472,200
Des Moines drainage district No. 1.	430 -450	R.	(²)	.....	.....	196,830	Proposed.....	(³)	.....	25,300	2,530,000
Louisa-Des Moines drainage dis- trict No. 4.	450 -460	R.	(²)			([?])	do.....	(³)	.....	16,000	1,600,000
Oquawka, Ill., to Keithsburg, Ill.	440 -452	L.	+2.8	.....	.....	.....	Prohibitive.....	949,300	189,860	1,720	51,600
Keithsburg drainage district.....	453.5-456.5	L.	+3	196,602	24,575	12,397	Built.....	93,800	18,760	1,294	129,400
Muscatine-Louisa drainage dis- trict No. 13.	460.5-480.5	R.	+3	364,545	72,900	173,468	Proposed.....	97,000	19,400	16,750	1,675,000
Louisa County levee district No. 15.	460.5-467	R.	+3	538,600	73,608	110,000	do.....	143,000	28,600	5,450	81,750
Bay Island drainage and levee district No. 1.	459 -473.5	L.	+4	732,232	76,884	116,130	Built.....	70,300	14,060	19,300	1,930,000
Drainage union district No. 1.....	473.5-479	L.	+3	164,300	23,000	.....	.....do.....	(⁴)	.....	6,000	750,000
Levee sub-district No. 1 of drainage union district No. 1.	473.5-476.5	L.	+3	120,000	16,800	5,200	do.....	19,610	3,922	4,100	512,500
Drury drainage district.....	476.5-485	L.	+3	312,360	39,000	46,500	do.....	258,800	51,760	5,200	650,000
				16,303,615	2,681,807			28,643,010	6,234,582	782,379	121,384,005

LETTER OF ACTING SECRETARY OF MISSISSIPPI RIVER COMMISSION.

MISSISSIPPI RIVER COMMISSION,
OFFICE OF THE SECRETARY,
St. Louis, Mo., November 8, 1913.

From: The acting secretary, Mississippi River Commission.
To: The president, Mississippi River Commission.
Subject: Report, examination of the Mississippi River from Cape Girardeau, Mo., to Rock Island, Ill.

1. In compliance with resolution of the commission, dated April 14, 1913, I submit the following report upon the examinations and investigations made by this office in connection with the examination of the Mississippi River from Cape Girardeau, Mo., to Rock Island, Ill.

2. For the purposes of the present investigation it was deemed sufficient to rely on manuscript data from all available sources, making no actual surveys in the field until the matter contained in the present report shall have been examined by the commission and until the nature and extent of the additional information desired shall have been determined. Accordingly, the data with regard to the location and grade of existing levees and the organization of levee and drainage districts was secured by correspondence with the officers of the several districts, supplemented by such visits from representatives of this office as were found necessary to the desired end. The location of the present bank lines and channel works was obtained from the reports of the Rock Island and the St. Louis engineer districts and the information was brought up to the end of 1912. High-water profiles were constructed from information on file at this office and obtained from the district offices and the report of the Board on Examination and Survey of the Mississippi River, 1909.

3. The work of collecting and assembling the data was assigned to Assistant Engineer Eugene L. Harman of this office, whose report, accompanied by maps and profiles, is submitted herewith. This report, with its accompanying maps, shows quite fully and completely the existing conditions of the work that has heretofore been done and that which is now proposed by the local levee authorities. The estimate of the probable cost of raising the existing levees to a height of 3 feet above the highest reported flood, and the building of such levees for the protection of those basins where levees now exist or are proposed, is in course of preparation and will be submitted as a part of this report as soon as it is completed.

W. B. LADUE,
Major, Corps of Engineers.

REPORT OF ASST. ENGINEER EUGENE L. HARMAN.

MISSISSIPPI RIVER COMMISSION,
OFFICE OF THE SECRETARY,
St. Louis, Mo., November 5, 1913.

From: Eugene L. Harman, assistant engineer.
To: The secretary, Mississippi River Commission.
Subject: Report on examination of Mississippi River from Cape Girardeau, Mo., to Rock Island, Ill.

The river and harbor act of March 4, 1913, contains the following:
"The Mississippi River Commission shall make an examination of the Mississippi River from Cape Girardeau, Mo., to Rock Island, Ill., with a view to such improvements as will at the same time promote navigation, develop water power, and protect property adjacent to said river from damage by floods; and in making such examination consideration shall be given and recommendations made as to plans for cooperation of the localities affected; and for the purpose of such examination and for the building of such levees between said points upon the river in aid of navigation as may be found necessary or desirable by the commission and approved by the Chief of Engineers a sum of \$200,000 is hereby appropriated."

The following from the president of the Mississippi River Commission to the secretary is self-explanatory:

MISSISSIPPI RIVER COMMISSION,
U. S. S. "MISSISSIPPI,"
Memphis, Tenn., April 14, 1913.

From: The President, Mississippi River Commission.

To: The secretary, Mississippi River Commission.

Subject: Examination, Cape Girardeau to Rock Island.

1. The following resolution, passed by the commission at its meeting this date, is sent for your information and guidance:

"That the secretary be directed to make such surveys as may be necessary and secure from all available sources such maps and other data relating to location of present river bank lines, location and grade of existing levees, high-water profiles, location and character of channel works, area and character of lands protected from floods or subject to overflow, all in compliance with the act of Congress requiring 'An examination of the Mississippi River from Cape Girardeau, Mo., to Rock Island Ill.'"

The data thus obtained to be platted, as far as may be practicable, on the published commission maps, which, together with a full report on the said examination, shall be submitted to the commission not later than the date of the usual fall meeting.

For this purpose it is recommended that the sum of \$10,000 be allotted from the appropriation of \$200,000 made for an examination of the Mississippi River from Cape Girardeau to Rock Island.

C. McD. TOWNSEND,
Colonel, Corps of Engineers.

The work of obtaining this information, preparation of maps, profiles, and reports was assigned to Eugene L. Harman, assistant engineer in charge of surveys.

The results of the examination are shown on Mississippi River Commission maps Nos. 104 to 150, inclusive (miles 48 to 508 above Cairo), herewith¹ and this report.

A portion of the upper alluvial valley map of the Mississippi River is submitted herewith as an index or ready-reference map to show the scope of the country affected at a glance, with the detail charts and the levee and drainage districts shown thereon. A profile of this portion of the river is submitted, showing the high-water slopes, to which the several levee districts refer their levees, and the top of the banks, thus showing at any point a close approximation of the height of the levee necessary at that point to protect the land from overflow.

SOURCES OF INFORMATION.

It was deemed quite sufficient for a general report of conditions as they exist at present to rely on manuscript data from all available sources and make no actual surveys in the field until such time as the commission may further order after reviewing the information herein contained.

The channel works, shore lines, etc., between banks are obtained from the plats and reports of the Rock Island and the St. Louis engineer district offices, and are brought up to the end of 1912. Both districts are working under approved projects and bringing their work to completion as far as available appropriations will permit. The exact status of each district can be found in its annual report to the Chief of Engineers.

High-water profiles are constructed from the information on file in this office in the form of gauge records, high-water marks, etc., obtained from the observations at this office, the Rock Island engineer district and the St. Louis engineer district offices, and the maps and report of the Board on Examination and Survey of Mississippi River, 1907-1909.

The topography in the blank spaces between the regular topography along the river and the bluffs on the published charts is taken from the published maps of the board on examination and survey of Mississippi River from St. Louis down, and there being no interior topography above St. Louis, the space is filled in with road maps, etc., taken from county maps, levee and drainage district maps, and that along the Missouri River is from a map of the Missouri River borrowed from the Kansas City engineer district office; and that between East St. Louis, Ill., and the bluffs is taken from the maps of the East Side levee and drainage district.

Levee and drainage districts.—Plats and profiles of these are obtained from the office of the several districts, the engineers of same, and some from Chief of Engineer and

¹ Not printed.

agricultural reports, in which levees are either proposed or built, all the particulars being given in the description of each district.

The several districts are given below in which the figures and letter in parenthesis indicate miles above Cairo and the right or left bank.

1. *East Cape Girardeau and Clear Creek levee and drainage district.*—(47.5–60.5 L.) Built.) Joseph Bunch, president, McClure, Ill.; A. C. Jaynes, secretary, Cape Girardeau, Mo.

Blue-print map of district and profile of levee on file in office of secretary, Mississippi River Commission. The limits of this district extend from Gale, Ill., up the levee along the Mississippi River to the old embankment of the Illinois Central Railroad at East Cape Girardeau, thence $1\frac{1}{2}$ miles northeast along said embankment, thence northeasterly along the levee to the mouth of Clear Creek, thence along the levee following the left bank of Clear Creek to McClure, Ill., thence in a southerly direction about 5 miles, using the Illinois Central Railroad embankment as a levee to Gale, Ill., the point of beginning.

The district comprises 9,392 acres of land, all under cultivation, and 153.8 acres not assessed and belonging to the Illinois Central Railroad, having been given to that company in consideration of the use of that company's embankment for a back levee. Property in the district is valued at from \$75 to \$100 per acre.

The elevation of the top of the levee is 3 feet above the high water of 1903, and it contains 338,645 cubic yards of earth at a cost of 12.85 cents per yard, or a total cost \$43,516.

The section of the levee is, outside slope 3:1, crown 6 feet wide, and inside slope 2:1.

2. *North Alexander County drainage district.*—(47.5–60.5 L.) (Proposed.) James E. Edges, president, McClure, Ill.; J. T. McClure, secretary, McClure, Ill.

The district lies in the northern part of Alexander County, Ill., and has the following limits: Beginning at a point on the Illinois Central Railroad, three-fourths of a mile north of Gale, thence following in a northerly direction along said railroad to McClure, Ill., thence easterly along the south bank of Clear Creek to the bluff, thence following along a proposed drainage ditch along the foot of the bluff to the point of beginning. A short levee across Clear Creek is proposed at the upper end of the district, from which point the main drainage ditch will carry the water of Clear Creek and the drainage of the bluff to Sexton Creek at the lower end of the district, where it will empty it into the Mississippi River.

A levee is proposed at the lower end of the district about one-half mile long, on the right bank of Sexton Creek, to prevent backwater overflow up that creek into the district.

The district comprises approximately 4,500 acres, 80 per cent of which is under cultivation and valued at from \$75 to \$100 per acre.

A map of this district is on file in the secretary's office, M. R. C./881, sheet 183.

3. *Clear Creek drainage and levee district.*—(59–69 L.) (Proposed.) W. R. S. Reynolds, president, Jonesboro, Ill.; S. M. Davie, secretary, Vineland, Ill.

This district is in Union and Alexander Counties, Ill., immediately north of the East Cape Girardeau and Clear Creek levee and drainage district and the North Alexander County levee and drainage district, and extends from McClure, Ill., up the bank of the Mississippi River to a point west of Ware, Ill.; thence easterly to the bluffs; thence along the bluffs about 10 miles to where Clear Creek leaves the bluffs, and down the south bank of Clear Creek to McClure, the point of beginning. The proposed levee is to extend only along the bank of the Mississippi River. The natural drainage is from the Mississippi River back to the bluffs, and a main ditch, to which there are auxiliary ditches, is proposed to be excavated along and through Clear Creek, running parallel to and near the bluffs.

There are approximately 20,000 acres in this district, two-thirds of which is cultivated, and valued at \$75 to \$100 per acre.

All work in this district is proposed, and a map and profile of levee are on file in the office of the secretary, Mississippi River Commission.

The section of proposed levee is 3:1 slopes, both sides; crown, 4 feet wide. The levee will require 556,590 cubic yards of earth embankment, and although the contract has not been let, will cost about 13 cents per cubic yard, or \$72,357. This estimate is based on a levee to be 3 feet above the high water of 1903.

Preston levee and drainage district.—(68.5–81.5 L.) (Under construction.) Commissioners: Thomas Aldridge, president, Aldridge, Ill.; Ernest Alden, secretary, Ma, Ill.; W. J. Stevens, attorney, Murphysboro, Ill.; Ed. Cox, engineer, Carbona, Ill.

This district is in Union County, Ill. The limits are as follows: Beginning at Williams Landing; thence following the levee upstream along the bank of the Mississippi River to a point about one-half mile below the mouth of Big Muddy River; thence

continuing along the levee in an easterly and northeasterly direction along the left bank of Big Muddy River to a point 1 mile below the Union-Jackson County line; thence in an easterly direction about three-fourths of a mile to the end of the levee at the bluff; thence following the foot of the bluff about 4.5 miles in a southerly direction to Wolf Lake, Ill., on the St. Louis, Iron Mountain & Southern Railroad; thence continuing along said railroad about 4 miles in a southeasterly direction to the upper limits of Clear Creek drainage and levee district; thence in a westerly direction about 2 miles to the lower end of the levee, the point of beginning. The levee and ditches are under construction. The levee will be built 3 feet higher than the high water slope of 1903, and will have the following sections: 5 feet or less in height, crown 6 feet, slopes 2:1 both sides; 5 to 12 feet or less in height, crown 6 feet, slopes 3:1 both sides; over 12 feet in height, 8-foot crown, 3:1 slopes both sides. The maximum height of levee is 15 feet.

The district contains 14,743 acres, valued at \$50 per acre in its present unprotected state. About 50 per cent of the area is under cultivation. It is estimated that the cost of constructing levees and ditches in this district will be about \$135,000.

There is a blue-print map of the district in the office of the secretary, Mississippi River Commission (file M. R. C./881, sheet 234), but no profile of the levee has been obtained.

5. *Grand tower drainage and levee district.*—(79-83 L.) (Built.) C. C. Huthmacher, president, Grand Tower, Ill.; M. W. Baysinger, M. D., secretary, Grand Tower, Ill.; R. J. Stevens, attorney, Murphysboro, Ill.

Map and profile of this district on file in office of secretary Mississippi River Commission.

This district lies in Jackson County, Ill., and the work is completed. The lower end of the levee is on the north bank of Big Muddy River, about 2 miles from its mouth, thence following the right bank of that river up to the Union-Jackson county line, thence in a northwesterly direction along the bank of a slough to an east and west public road at the north side of section 32, township 11 north, range 3 west. The levee forms the eastern limit of the district. The limits then run west along the public road about $1\frac{1}{2}$ miles to the east bank of the slough behind Big Muddy Island, thence in a southerly direction along said bank of slough to the center of section 18, township 10 north, range 3 west, the point of beginning.

The lower portion of this district protects from Big Muddy River overflow.

The section of the levee is: Outside and inside slopes 2:1, the crown varying from 6 feet to 14 feet, depending on the height of levee. The elevation of the top of the levee corresponds to the high water of 1903 and required 57,800 cubic yards of earth at 14 cents per cubic yard, a total of \$8,092. The area of the district is 2,640 acres, 80 per cent of which is in cultivation, valued at from \$65 to \$80 per acre.

6. *Deggania and Fountain Bluff drainage and levee district.*—(89-104 L.) (Under construction.) Henry Arbiter, president, Gorham, Ill.; F. J. Raddle, secretary, Murphysboro, Ill.; Joel Dunn, chief engineer, Gorham, Ill.; J. G. Dunn, assistant engineer, Gorham, Ill.

Blue-print map and profile of district and levees are on file in office of secretary Mississippi River Commission.

The levee (under construction) begins at Cora, Ill., and extends down the east bank of the Mississippi River to the Illinois Central Railroad at Fountain Bluff station. It has a crown of 5 feet, inside slope 2:1, and outside slope varying from 2 to 4:1, depending on height of levee, cubical contents of which are 493,518 cubic yards of earth, at approximately 14 cents per cubic yard, or a total of about \$69,092.

The limits of the district are the levee on the southwest side, the Illinois Central Railroad embankment from the river to the bluff on the lower end, and the foot of the bluff up to Cora, Ill., on the north or northeast, comprising an area of 29,293 acres of land, approximately valued at \$65 to \$80 per acre. Eighty-five per cent of the land is in cultivation.

7. *Levee district No. 2, Perry County, Mo.*—(103-112.5 R.) (Partly under construction.) Names of commissioners not submitted. Ralph D. Killian, engineer, Perryville, Mo.

Beginning at Jones Point, Mo., it is proposed to build a levee back to Cape Cinq Hommes Creek, up and along which a levee and ditch are now being built to about Menfro, Mo., thence on a proposed cross levee to the river to a point near the head of Puckett Towhead; thence continuing down the Mississippi River to Jones Point, the point of beginning.

The river levee is proposed to be built about to a height corresponding to a stage of 36.5 feet on the St. Louis gauge, or 1.5 feet below the high-water stage of 1903. This portion of the levee is not to exceed an average height of 2.5 to 3 feet. The portion of the levee across the lower end of the district will average about 6 feet

height. The levee up Cape Cinque Hommes Creek is being built to withstand a flood equal in height to that of 1903, and will average about 9 feet in height.

It is estimated by the engineer in charge that the entire work in this district will approximate 100,000 cubic yards. (No cost given.)

The area of the district is approximately 12,000 acres, 75 per cent in cultivation, and valued at \$100 per acre. The uncleared portion, 25 per cent, of the land is valued at \$25 to \$30 per acre.

NOTE.—This levee district combined with levee district No. 1, Perry County, Mo., hereinafter described, comprises what is known as drainage district No. 1, Perry County, Mo.

8. *Levee district No. 1, Perry County, Mo.*—(112.5–117 R.) (Partly under construction.) Names of commissioners not submitted.

This district lies immediately above levee district No. 2, in Perry County, Mo., and has the following limits: Beginning at a point on the bank of the Mississippi River near the head of Puckett Towhead; thence following in a southwesterly direction about 3 miles along a proposed levee; thence along an old levee at the foot of the bluff about 5 miles to Perryville Junction, Mo.; thence along a levee down the bank of the old channel of the Mississippi River to its end, about $1\frac{1}{2}$ miles west of Clearyville, Mo.; thence in a southeasterly direction about $4\frac{1}{2}$ miles along a public road to the proposed junction of the levees of levee districts Nos. 1 and 2, the point of beginning.

The district comprises approximately 8,500 acres, all cultivated and valued at \$100 per acre. The levee in this district is just about high enough to withstand a stage of 38 feet on the St. Louis gauge. About 2 miles of the levee along the bluff maintains an average height of 7 feet. The average height of the levee along the old river bank is about 3 feet, and the land from the lower end of the levee to the lower end of the district will not be overflowed at a 38-foot stage on the St. Louis gauge.

This district has been considering the raising of its levees, and a profile of the top of the existing levees and the ground elevations along the road from the lower end of the existing levee to the upper end of the proposed levee in levee district No. 2 is on file.

9. *Kaskaskia Island sanitary and levee district.*—(117–124.5 R.) (Proposed.) Commissioners: William H. Doza, St. Marys, Mo., R. R. No. 2; E. C. Kerr, St. Marys, Mo., R. R. No. 2; Wm. Sulser, St. Marys, Mo., R. R. No. 2. Officers: T. N. Jacobs, consulting engineer, East St. Louis, Ill.; Wilford Thompson, chief engineer, East St. Louis, Ill.; E. A. Crisler, Chester, Ill., attorney; Emery Andrews, Mattoon, Ill., attorney.

The district was organized July 1, 1913, and it is proposed to construct a levee around Kaskaskia Island to protect it from overflow, and establish an internal drainage system. It is proposed to protect 25,000 acres of very fertile land, now valued at \$125 per acre. Eighty per cent of this land is now under cultivation, the balance being in timber. A force of engineers is now at work on the island, making a topographical survey to determine the acreage of land owners for purposes of assessment.

It is proposed to build a levee around the island 3 feet above the stage of high water in 1844, and construct a pumping plant to dispose of drainage. An approximate estimate of costs, made by Mr. T. N. Jacobs, consulting engineer for the district, is as follows: For drainage ditches, \$10,000; for pumping plant, \$5,000.

A provisional location of the proposed levee was laid down on the map of the Mississippi River in the office of the secretary Mississippi River Commission and a profile of the levee made from data thereon, from which it is estimated that a total of 1,704,500 cubic yards will be necessary for levee construction, which at an estimated cost of 14 cents per cubic yard gives a total of \$138,630. Adding 10 per cent to this amount for engineering and contingencies, or \$13,863, \$5,000 for a pumping plant, and \$10,000 for drainage ditches, gives a total cost for the drainage and levee system of \$167,493.

10. *Levee and drainage district No. 5.*—(137.5–152 L.) (Built.) D. M. Hardy, secretary, Waterloo, Ill.; F. M. Brickey, president, Prairie Du Rocher, Ill.; J. F. Burkhardt, commissioner, Prairie Du Rocher, Ill., R. R. No. 4.

The district lies in Monroe and Randolph Counties, Ill., above, back of, and below the Stringtown levee and drainage district No. 4. That portion of the levee in Monroe County, Ill., extends from Ivy Landing to Kidd Landing, being $3\frac{1}{2}$ miles long (miles below Eads Bridge—41 to 44), joining the levee of the Stringtown levee and drainage district No. 4 at that point. The remaining portion of the levee, which lies in Randolph County, is about 1 mile long, beginning at the lower end of the Stringtown levee and drainage district No. 4, back of Fort Chartres Island and extending along the left bank of Fort Chartres Slough to nearly the foot of Fort Chartres Island.

There is no profile of the levee of this district in the possession of any of the commissioners of the district nor on file at the courthouse at Waterloo, Ill. A profile, made from data on the Mississippi River Commission chart No. 111, scale 1:20,000, indicates that the average height of the levee in Monroe County is 7 feet, and that it contains 119,100 cubic yards. From the same source it was ascertained that the portion of the levee in Randolph County has an average height of 9 feet and contains 41,960 cubic yards, making a total of 160,820 cubic yards in the entire levee, which, at 15 cents per cubic yard, cost \$32,160.

The upper limits of the district are the same as the lower end of levee and drainage district No. 1, viz, from Ivy Landing, Ill., along a ridge running north to the bluff at a point just below Brandts Lake, from which point the limit extends down the foot of bluff to Prairie Du Rocher, Ill.; thence along the south bank of Goose Lake, on the Stringtown-Prairie Du Rocher public road to where it crosses the St. Louis, Iron Mountain & Southern Railroad; thence southwest along a public road to the high bank of the Mississippi River, near head of Turkey Island; thence northwest to the lower end of the levee, near the foot of Fort Chartres Island.

The western limit of the district is the levee in Randolph County, above described, the drainage ditch running at the back of the Stringtown Levee and drainage district No. 4 to Kidd Landing, Ill., and the levee in Monroe County, described above as running from Kidd Landing to Ivy Landing, Ill.

The district has a total area of 10,000 acres, 3,100 of which are assessed for drainage and 6,900 for levee protection. Ninety-five per cent of the total area is cultivated and valued at \$60 to \$70 per acre. A tracing, M. R. C./881, sheet 59, was made from the only map available, but shows that portion of the district subject to drainage assessment and the location of levee, but does not show the limits of the district. These were obtained from Mr. Bennett James, Waterloo, Ill., secretary and commissioner of Harrisonville and Ivy Landing Levee and drainage district No. 2.

11. *Stringtown Levee and drainage district No. 4.*—(141.5–147 L.) (Built.) The commissioners for the district are as follows: D. M. Hardy, Waterloo, Ill.; F. V. McClenahan, Prairie Du Rocher, Ill., R. R. No. 4; John F. Burkhart, Prairie Du Rocher, Ill., R. R. No. 4; Arsene Debourge, Prairie Du Rocher, Ill., R. R. No. 4.

The district has an area of 2,795 acres, 2,330 acres being in Monroe County and 465 acres in Randolph County, Ill., all cultivated and valued at from \$50 to \$60 per acre.

The levee begins at Kidd, Ill., on the old high bank of the Mississippi River, back of Salt Lake Towhead, and follows down the bank to Penitentiary Point and down behind Fort Chartres Island to a point $1\frac{1}{4}$ miles below the Monroe-Randolph county line, where it ends.

There is no profile of the levee now existing in the hands of any of the commissioners nor on file with the county clerk at Waterloo, Ill. The elevation of the top of the levee now corresponds to the high watermark of 1903, viz, 400.7 feet Memphis datum at its upper end, 399 at Penitentiary Point, and 397 at its lower end. Using the information on M. R. C./839 map to determine surface of ground along the levee, it was found that the average height of levee is 7 feet.

As the levee has a crown of 6 feet, outside slope 3:1, inside slope 2:1, and a length of 23,100 feet, the levee, muck ditches, and 4 road crossings would contain 155,600 cubic yards, which, at 15 cents per yard, brings the total cost to \$23,348.

12. *Moredock and Ivy Landing drainage district No. 1.*—(150–164 L.) (Built.) The officers of the district are: William Feldmeyer, Valmeyer, Ill., R. R. No. 2; William Thorn, Valmeyer, Ill., R. R. No. 2; John Herbst, sr., Waterloo, Ill.

This is a drainage district only, lying entirely within Monroe County, Ill., having irregular limits, all lying within the Harrisonville and Ivy Landing levee and drainage district No. 2, and is that portion of low-lying lands in that district not assessed for levee protection.

There is no available map of district No. 1 in the possession of any of the commissioners, nor on file at the courthouse at Waterloo, Ill.

The area of the district is 5,000 acres, 33 per cent of which is in cultivation, and valued at \$60 to \$70 per acre.

13. *Harrisonville and Ivy Landing levee and drainage district No. 2.*—(150–173 L.) (Built.) The officers of the district are as follows: John Klein, president, Valmeyer, Ill., R. R. No. 2; John G. Schneider, vice president, Valmeyer, Ill., R. R. No. 2; Bennett James, secretary and commissioner, Waterloo, Ill.

There is no map of the district in the possession of any of the officers of the district nor on file with the county clerk at Waterloo, Ill.

The upper limit of the district is a levee along Fountain Creek from Fountain, Ill., to Harrisonville, Ill., which continues thence down the bank of the Mississippi back of Lucas Bar and Calico Island to Ivy Landing, Ill. (mile 28 to 40.5 below Eads Bridge, St. Louis).

The lower limit of the district is a ridge running from Ivy Landing, Ill., back to the bluff below Brandts Lake, the foot of the bluff from this point to Fountain, Ill., being the easterly limit of the district, and all lying within Monroe County, Ill.

The area included is approximately 20,000 acres, 75 per cent of which is in cultivation and valued at from \$60 to \$70 per acre. The levee has a total length of about 19½ miles, 6½ miles of it being along the Fountain Creek and having a crown of 8 feet, and 13 miles along the Mississippi River, having a crown of 16 feet and used as a county road.

The levee has an outside slope of 3:1 and an inside slope of 2:1 throughout its length, and its top is 1 foot above the high-water mark of 1903.

14. *Columbia drainage and levee district No. 3.*—(163–179.5 L.) (Built.) The officers of the district are: Fred Louer, Valmeyer, Ill., R. R. No. 1, commissioner; Fred Rusterberg, Valmeyer, Ill., R. R. No. 1, commissioner; Frank Thoma, Columbia, Ill., commissioner; Aug. F. Weinell, secretary, Columbia, Ill.

The district lies entirely within Monroe County, Ill., and is immediately below and adjoining the Wilson & Wenkel levee and drainage district No. 6, which maintains the levee forming the upper limits of the Columbia drainage and levee district No. 3. The levee then continues on down the bank of the Mississippi River, passing behind Beard and Foster Islands to a point one-half mile above the mouth of Fountain Creek near Harrisonville, Ill. The lower limit of the district is formed by the levee along the right bank of Fountain Creek to the bluff near Fountain, Ill., and the foot of the bluff at this point to one-fourth mile below the St. Clair-Monroe County line forms the eastern limit.

The upper half of Columbia Creek is leveed on both sides and the lower half on its lower or left bank. The north branch of Fountain Creek, which flows through Warlock Station, Ill., is leveed on both sides and drains west through the levee back of Beard Island.

There is an antiquated profile of the levee of this district on file at the county clerk's office at Waterloo, Ill., which shows that the datum used was established by assuming the elevation of the ground as 100 feet. This levee was built in 1882 and has been raised from time to time, there having been no records kept to show the amount of raises. The elevations of the top of the present levee show it to be that of the high water of 1903, but the yardage of the present levee can not be obtained by using the old profile.

The levee now has a crown of 6 feet, outside slope 3:1, and inside slope 2:1.

The area of the district is approximately 12,800 acres, 85 per cent of which is in cultivation, and valued at about \$60 to \$70 per acre.

A tracing made from the original map at Waterloo, Ill., is on file in the office of the secretary, Mississippi River Commission, file M.R.C./881, sheet 57.

15. *Wilson & Wenkel levee and drainage district No. 6.*—(179.5–181.5 L.) (Built.)olph Lambrecht, president, Columbia, Ill.; H. N. Kunz, secretary, Columbia, Ill.; Louis Wecker, commissioner, Columbia, Ill.; Otto Kuni, commissioner, Columbia, Ill.

The district is all in Monroe County, Ill., the upper limit being the St. Clair-Monroe County line; thence following a public road 1¼ miles down the river from the county line to the upper end of the levee; thence continuing down the levee about three-fourths of a mile on the bank of the slough behind Carroll Island; thence following the cross levee where it turns back to the bluff to a point about one-fourth of a mile below the St. Clair-Monroe County line.

The area of the district is 1,523 acres, all cultivated, and valued at \$100 per acre. This district was formerly a part of the Prairie Du Pont drainage and levee district, and the levee and cross levee were built by that district.

The levee is built 2 feet above the high water of 1903, and has the following cross section: Outside slope 3:1, inside slope 2.5:1, and a crown of 10 feet. A copy of the profile of the cross levee is in the office of the secretary, Mississippi River Commission.

16. *Prairie Du Pont drainage and levee district.*—(181.5–185 L.) (Built.) Adam Krr, president, Belleville, Ill.; Louis J. Dyroff, secretary, Dupou, Ill.; Charles La-rix, East Carondelet, Ill.

This drainage and levee district is limited on the south by the St. Clair-Monroe County line, Ill.; on the west by a levee along the Mississippi River to East Carondelet (which continues up the east bank of Prairie Du Pont Creek to Prairie Du Pont, Ill.); thence along the Prairie Du Pont Creek to the bluff, the bluff being the eastern limit of the district. The original Prairie Du Pont drainage and levee district included about 2 square miles of territory in Monroe County, but this 4 miles of levee is maintained and assessed for the Wilson & Wenkel levee and drainage district No. 6.

The area of the district is 8,244 acres, 97.5 per cent under cultivation or in use as town property, and valued at an average of \$100 per acre. In two years, at a payment of 25 cents per acre per year, the lands will have been taken up by the levee district. The cost of constructing, repairing, and maintaining the levee, including \$1,500 spent for drainage purposes, is about \$90,000.

All maps and records of this district were lost in the high water of 1903. The minutes of a meeting of the levee commissioners in that year show that an ineffectual attempt was made to find a map of the district on file at the county courthouse at Belleville, Ill. A like attempt by this office in August, 1913, met with the same result.

A borrowed profile gives the elevation of the top of the levee as 2 feet above the high water of 1903, or 424 feet Memphis datum at its upper end and 420.4 at its lower end. The total length of levee is 4.25 miles, at an average height of $6\frac{1}{2}$ feet, outside slope 3:1, inside slope 2.5:1, crown 12 feet, and, including muck ditches and road crossings, contains approximately 171,330 cubic yards of earth embankment, at 14 cents per cubic yard, or a total cost of \$23,986.

17. *East Side levee and sanitary district.*—(185–207.5 L.) (Partially built.) Board of trustees: G. L. Tarleton, president, Sexton Building, East St. Louis, Ill.; Robert E. Conway, Sexton Building, East St. Louis, Ill.; F. W. Mollman, Sexton Building, East St. Louis, Ill.; Peter W. Sunderland and E. R. Jones, East St. Louis, Ill.

This district was organized in July, 1907, and the work is under construction. The limits of the district are as follows: Beginning at a point on the bank of the Mississippi River about 1 mile below the town of Cahokia; thence following up along said bank to Venice, Ill.; thence continuing in a northeasterly direction to the northwest corner of Madison County; thence in an easterly direction about 4 miles to the southwest corner of section 26, Chouteau Township; thence due north two miles; thence in a southeasterly direction about 4 miles to the southeast corner of section 31, Chouteau Township; thence following the general direction of Cahokia Creek to the southeast corner of Nameoki Township; thence due south 2 miles; thence west 2 miles; thence in a southerly direction about 5 miles to the bluff at the southwest corner of section 34, Centerville Station Township; thence following closely the foot of the bluff to section 18, at the south line of Centerville Station Township; thence in a northwesterly direction about 5 miles to the point of beginning.

The general plan of works for the protection and drainage of the district is as follows:

Changing the course of Cahokia Creek from about the point where it emerges from the bluffs, through a diversion channel directly west to the Mississippi River, the earth from the cut to be used in constructing high levees on either side, thus forming the northern protection. On the west a system of levees, equal in height to a 45-foot stage of water in the river, connecting with the levee of the diversion channel and continuing to the southern limits of the district. On the south a levee back to the bluffs, along the north side of the diversion channel of Prairie Du Pont Creek.

In the interior a system of drainage canals beginning in the northern end of the district, running south through the present lakes and passing out through the south levee, the water in low stages of the river to pass through the levee by means of flood gates. When the river is high, gates to be closed and water forced through levee by means of pumps of large capacity.

Lateral canals will be added to main drainage canal to catch and control creel issuing from the bluffs and to reverse the natural westward flow of drainage west of the canal, discharging it into the main canal.

All levees are to have 3:1 slopes, both sides, except along the river where they are to be protected by a concrete facing, when the outside slope will be 2:1. The top of all levees in the district are to be 7 feet above the high-water stage of 1903, or 10 feet above that of 1844. The crown of the levee along the Cahokia diversion canal is to be 10 feet, all other levees 8 feet.

The Cahokia diversion canal is to have a bottom width of 100 feet, side slopes 2:1, berm to toe of levee 50 feet. The bottom of canal at Cahokia Creek is to be 425 feet Memphis datum. The height of the 1844 flood at this point was 436.9 feet, Memphis datum. The bottom slope of the canal westward from the bluff is to be 1 foot per mile.

The total area of the district is 96.32 square miles. The real value of the land is \$57,486,000, and the \$6,500,000 for cost of construction of the system is to be paid by taxation.

18. *Chouteau, Nameoki, and Venice levee and drainage district.*—(193.5–207.5 L.) (Built; now partially embraced in the East Side levee and sanitary district.) Commissioners: Conrad Rath, Nameoki, Ill.; August Zippel, Nameoki, Ill., secretary; Fred Kohl, Venice, Ill., collector; C. F. Stelzel, Granite City, Ill., treasurer.

This district lies in the southern portion of Madison County, Ill., and has the following limits: Beginning at Venice, Ill., and following the levee up the left bank of the

Mississippi River behind Cabaret and Chouteau Island's to the new channel of Cahokia Creek, thence about 2 miles in a southeasterly direction to the Chicago & Alton Railroad tracks, thence following said tracks about 3.5 miles in a southerly direction to Mitchell, Ill., thence about 3.5 miles in a southeasterly direction to the upper end of a levee along the Venice and Alton road, thence about 9 miles in a southeasterly direction along said road to Venice, the point of beginning.

The district was organized and the levee built in 1882 at a cost of \$146,000, or 9 cents per cubic yard of earth. The levee has the following section: Outside slope, 2:1; crown, 8 feet; inside slope, 3:1; and an average height of 10 feet throughout the district. That portion of the levee along the river is built 3 feet above a stage of 38 feet on the St. Louis gauge, which is the high water of 1903. The back levee along the Chicago & Alton Railroad and that on the north bank of Horse Shoe Lake are 2 feet lower than the high water of 1903. That part of the district between Mitchell, Horse Shoe Lake, and Granite City is for the most part above overflow.

There is no drainage system in the district.

There are 18,000 acres in the district, and the estimated real value of the factories, buildings, and land is \$12,000,000.

About 10,800 acres in this district are now within the limits of the East Side levee and sanitary district, but on account of some legality the property owners are not required to pay assessments to the last-named district. The levees are all in good condition, are all paid for, and the district has a surplus fund of \$9,700 for maintenance work.

There is no map of the district available, but Mr. Fred Kohl, collector for the district, has promised to bring a profile to the office of the secretary, Mississippi River Commission. The limits of the district were put on a map (M. R. C./881, pt. 2) from information furnished by Mr. Kohl.

19. *Chouteau Island levee and drainage district.*—(201–206.5 L.) (Built.) Commissioners: Gottlieb Willeredt, Nameoki, Ill., R. F. D. No. 1; Louis Buenger, Nameoki, Ill., R. F. D. No. 1; Fred Segar, Nameoki, Ill., R. F. D. No. 1.

The district comprises all of Chouteau Island, in Chouteau Township, Madison County, Ill.

A levee beginning at the foot of the island and connecting with that of the Chouteau, Nameoki, and Venice levee and drainage district, extends along the river side of the island its entire length, commencing again with the Chouteau, Nameoki, and Venice levee and drainage district levee at the head of the island. This levee forms the western limit of the district, while the Chouteau, Nameoki, and Venice levee and drainage district levee at the back of the island forms the eastern limit. The area protected from overflow is 1,950 acres, all under cultivation, and valued at \$30 to \$90 per acre.

The elevation of the top of the levee corresponds to a stage of 36 feet on the St. Louis gauge, or 2 feet below the high water of 1903. The section of the levee is as follows: Outside slope, 3 : 1; crown, 6 feet; and inside slope, 2.5 : 1. To date the cost of construction and maintenance of this levee has been \$60,000.

20. *County Ditch drainage and levee district, Madison County, Ill.*—(202–208 L.) Proposed; now embraced in the East Side levee and sanitary district.) Commissioners: Joseph N. Keys, East St. Louis, Ill.; Harman Fensterman, Edwardsville, Ill.; Harry Poag, Edwardsville, Ill.; C. H. Burton, attorney, Edwardsville, Ill. Sheppard & Morgan, engineers, Edwardsville, Ill. Contract let October 1, 1913, but work not begun.

This district lies entirely within Madison County, Ill., and contains the following sections: The north half of section 6, township 3 north, range 8 west; 432 acres of section 31, 360 acres in section 30, and 240 acres in section 19, township 4 north, range 8 west; the east half of section 36, all of sections 25 and 24, 560 acres in section 23, 120 acres in the east portion of section 22, 336 acres in section 13, all of section 14, and 269 acres in the eastern portion of section 15, township 4 north, range 9 west.

The one ditch running the length of the district comprises all of the work to be done. There will be 125,000 cubic yards of earth excavation in it, costing 13.5 cents per yard, or \$16,875. The total cost will bring the assessment per acre on the 4,700 acres benefited to \$5.35. All of the district will be under cultivation the coming year. There is no levee in this drainage district.

Map of this district is on file (M. R. C/881, sheet 201) in the office of the secretary, Mississippi River Commission.

21. *Wood River drainage and levee district.*—(210–214.5 L.) (Built.) Commissioners: Fred Crandall, chairman, East Alton, Ill.; James Chesson, secretary, East Alton, Ill.; Benhard Picker, East Alton, Ill. Engineers: Sheppard & Morgan, Edwardsville, Ill.

This district lies entirely within Madison County, Ill., and has the following limits: Beginning at the southwest corner of section 34, township 5 north, range 9 west; thence following along the Chicago, Peoria & St. Louis Railroad track $1\frac{1}{4}$ miles in a northwesterly direction; thence due west 1 mile along the bank of Wood River to the Mississippi River; thence following up the Mississippi River bank about $2\frac{1}{2}$ miles to the center of section 19, township 5 north, range 9 west; thence north about three-fourths mile to the track of the Cleveland, Cincinnati, Chicago & St. Louis Railroad; thence following along said tracks about 1 mile in an easterly direction to Wood River; thence following the north bank of Wood River about one-half mile in a northeasterly direction to the Chicago, Burlington & Quincy Railroad track; thence in a northerly direction along said track about 1 mile; thence in a general easterly direction about 2 miles to the north central portion of section 10, at the foot of the bluff; thence following south along the bluff about $4\frac{1}{2}$ miles to a point one-half mile below Grassy Lake station on the Wabash Railroad; thence due west about 1 mile to the point of beginning.

The system of drainage includes the changing of the channel of Wood River, building a levee on the south side of the upper end of the canal to the Cleveland, Cincinnati, Chicago & St. Louis Railroad, and a levee on either side from that point to the Mississippi River. All the drainage above the canal will flow through a floodgate into the canal during low stages of water, but, as no pumping plant is contemplated, the drainage will back up on the low lands during high-water stages of the Wood or Mississippi Rivers.

The district was organized in 1911 and all of the levee work except the lower one-half mile on both sides of the canal is completed. The levees are built to a stage of 38 feet on the St. Louis gauge (high water, 1903). The total cost of the project will be \$182,000. The area of the district protected is about 5,000 acres and the assessed valuation of the property is \$34,850, or about one-third of its real value.

A blue-print map (M. R. C./881, sheet 202), two blue prints of profiles of levee (M. R. C./881, sheets 203-204), and specifications of work to be done (M. R. C./881, part 2), are on file in the office of the secretary Mississippi River Commission.

22. *Columbia Bottoms, St. Louis County, Mo.*—(203-206.5 R.) (Provisional.)

This district comprises about 2,900 acres of fertile bottom land, all under cultivation, and valued at about \$110 per acre. The entire area is subject to overflow from 4 to 13 feet deep.

The Lucas levee, 3 miles long and extending along the high bank of the Mississippi River, was built to an elevation corresponding to a 37-foot stage on the United States engineer gauge at St. Louis, Mo., and it afforded but small protection from overflow as the land along the Missouri River was not leveed. A provisional levee location has been made in the office of the secretary, Mississippi River Commission, St. Louis, Mo., as follows: Beginning at the foot of the bluff, about three-fourths mile above Watkins Creek, thence following up the high bank of the Mississippi River and along the center line of the old Lucas levee about 3 miles to the mouth of the Missouri River; thence following up the high bank of the Missouri River about 4 miles to the foot of the bluff, and being 38,000 feet over its entire length. The elevation of the top of the provisional levee was taken as 6 feet above the high-water slope of the flood of 1903. The crown of the levee to be 6 feet and slopes 3:1 both sides; muck ditch to be 4 by 4 feet.

The approximate estimated cost of this project is as follows:

882,090 cubic yards earth embankment in levee, at 14 cents.....	\$123,492.
19,800 cubic yards earth excavation in main ditch, at 10 cents.....	1,980.
1,740 cubic yards earth excavation in lateral ditches, at 10 cents.....	174.
Cost of pumping plant and floodgate.....	10,000.
Engineering and contingencies.....	13,564.

Total..... 149,211

This cost would necessitate an assessment of \$51.45 per acre, exclusive of maintenance of levee and pump plant.

The profile is filed under M. R. C./881, sheet 239 in the secretary's office.

23. *Levee district No. 1, St. Charles County, Mo.*—(216-223 R.) (Proposed.) W. Brown, Wentzville, Mo., commissioner (for correspondence); John Schallenberger, West Alton, Mo., commissioner; W. H. Boehls, Alton, Ill., commissioner; Ben M. Nemeier, West Alton, Mo.

This is commonly known as West Alton, Mo., levee district.

The general location of the district is opposite Alton, Ill., between the Mississippi and Missouri Rivers, and 10 miles above junction of same. The original district (see blue print showing outline) was surveyed and estimates furnished by Alvin Riske, engineer, as follows: Levee to be 6 feet top, 2.5 to 1 back slope, and 1.5

river slope, with an average height of 7 feet, or built to a grade of 2.7 feet above 1908 flood or 0.3 foot below 1903.

For profile showing surface of ground and grade proposed, see M. R. C./881, sheet 116.

Estimates of cost on original district were:

Right of way, 60.26 acres, at \$50 per acre	\$3,013
Flood gates.....	1,860
Clearing.....	455
Construction, 182,304 cubic yards, at 15 cents.....	27,345
Total estimate.....	32,673

The engineer's salary is not mentioned, but incidentals, legal fees, and engineering expenses can be estimated at 10 per cent of the total cost. The above estimate was prepared about May, 1912, and was rejected by the landowners.

The district was visited in December, 1912 by W. J. Schlick, United States Department of Agriculture, office Experiment Station (file 1797-59), and enlargement of district proposed. See blue print M. R. C./881, sheet 85. The original district embraced approximately 2,500 acres, of which 2,000 acres are subject to overflow. Proposed enlarged district will contain about 4,500 acres, of which 3,500-4,000 are subject to overflow.

Mr. Schlick estimated the probable cost of a pumping plant for the enlarged district would be \$8,000 to \$9,000, to be located at the lower end of Brick House Slough. A tax of about 80 cents per acre would be necessary to maintain the plant in proper condition.

As a survey of the proposed enlargement of district was never made, estimates as to cost are only approximate. The probable average height of levee would be 9 feet, with a maximum of 13 feet. Sheet piling would have to be used in some places to stop seepage.

The general outline of the district is as follows:

Commencing at the Missouri & Illinois Bridge & Belt Railway embankment on the south and running northwest along the bank of the Mississippi River, crossing Brick House Slough at the lower end of Dresser Island, thence around the outer edge of the island to the upper end, thence across the upper end of Brick House Slough to the mainland, thence west a short distance to connect with a high ridge, thence along this high ridge in a southeasterly direction to the Chicago, Burlington & Quincy Railroad embankment, thence along this embankment and the Missouri & Illinois Bridge & Belt Railway embankment to the point of beginning. The railroad embankments are practically built to 1903 high water, and would serve as a part of the levee scheme in extreme high water.

If the levee is built to a 5-foot top and 3:1 slopes, as recommended by Mr. Schlick, and the railroad embankment is used as part of the system, that part of the embankment between the Big Wise Levee and the lower end of the proposed levee will have to be depended upon to hold back flood waters from backing up into the district. This stretch would be the weakest point in the system and would have to be strengthened.

Assuming that the levee would hold off the flood and save the district \$15 for every acre protected on 4,000 acres, the total amount saved would be about \$60,000. This, Mr. Schlick estimates, would nearly or entirely pay for the construction of the levee.

The soil is generally alluvium deposited by overflow. Top soil varies in depth from 1 to 8 feet, and is a close black loam, locally termed gumbo.

Practically all the area is under cultivation, possibly 5 per cent being uncultivated. The general locality has to be protected from overflow of the Mississippi and the Missouri Rivers during highest stages.

The principal crops are corn and wheat, an average crop when not overflowed being 40 to 50 bushels of corn per acre and 30 to 40 bushel of wheat. Value of land varies from \$50 per acre for the low ground to \$150 per acre for the high and rarely overflowed portion. An average value without levees is about \$70 per acre. With levee protection this would increase to approximately \$150 per acre.

Old residents stated the 1903 high water was 2½ feet over property in vicinity of post office at West Alton. The water went over the railroad tracks and flowed from the Missouri River toward the Mississippi. The Chicago, Burlington & Quincy Railroad have raised their grade line since 1903 and this protects to some extent the country on either side of the embankment from overflow from the Missouri or from the Mississippi River. (From file 1797-59). The district has probably been overflowed 175 days since 1844, or when stages of 31 feet or more existed at St. Louis.

The residents stated part of the lower areas were covered by yearly high water, but in general the average portion yielded good crops, none of which had been entirely

lost because of high water. The underdrainage is sandy and the fields are in good condition for cultivating within 48 hours after heavy rains.

The country on the Missouri River side of the Chicago, Burlington & Quincy Railroad is generally high and a small levee about 5 feet high, three-fourths mile long, protecting 450 acres with approximate cost of \$800, has been built privately. On the Mississippi side the high water usually occurs at a time that allows time for second planting, so that an entire crop failure from high water happens about once in 10 years. The men interviewed in the vicinity appear to wish levees and seem to think it would raise the value of the land 50 per cent and the cost of building the levees would be less than the loss from one crop failure. Some held the opinion they could lose one crop out of four and still make plenty of money and not be burdened with levee tax and upkeep. This divergence of opinions has caused the levee to be voted out, no actual work done, and the organization at present is kept up mainly to perform the necessary business obligations.

Earth can be moved on the Missouri River side of railroad for about 15 cents per yard under ordinary conditions. For more detailed report see file 1797-59, W. J. Schlick.

The present levees in this district are private and consist of the Big Wise Levee, the Old Smith Levee, and many small levees. The Big Wise Levee, owned by Alex. Wise, Alton, Ill., is about 1 mile long, protects approximately 600 acres, has about 30-foot base, and is built to a height equal to the railroad embankment, or approximately 1903 high water.

The levee withstands high water fairly well and is kept in fair condition. The levee marked Old Smith Levee (on file M. R. C./881, sheet 85), is approximately 2 miles long, 3 feet or more above 1912 high water, and furnishes protection against the lower of the Mississippi floods. The area protected is said to be 1,000 acres, but the levee is not kept up or of sufficient section to withstand high water. The elevations of all known high waters in this vicinity can be found in Mississippi River Commission Report, 1912, table No. 2.

Mr. Strong, Carl Daudt, and John Schallenberg, West Alton, Mo., own the levee and make repairs. It is said to have been built in 1885. Many other private levees are in existence, but are of much smaller size and were not considered.

24. *The territory from the upper end of Dresser Island to near Cuivre River.*—(225-252 R.) (Provisional.)

The area, as far as could be ascertained, has no organization or levee of any importance. Small private levees have been built in places to connect high ridges and protect small areas in that manner.

The general high water at Grafton is 18 feet or more and is approximately 430 contour, Memphis datum. This would indicate that the land was overflowed only during very high stages, and the residents withstand the overflow in preference to building levees. From various sources of inquiry it appears that this locality is rather high ground in the lower part and mostly cultivated, and the landowners, as a locality, have not realized the importance of complete protection from high water by a levee and drainage system.

The land values run from \$50 to \$60 per acre and the higher ground \$80 to \$100.

A provisional estimate for a levee and drainage system, based on data at hand, shows the following information, all of which is very approximate. The area in the district from a point near Eagle Nest Island (225 R) to Cuivre River, and including land to the bluffs near St. Charles, Mo., is 126 square miles, or 80,640 acres. The drainage area to be taken care of is 213 square miles, 65 square miles of which are drained by Peruque Creek and 148 square miles by Dardenne Creek.

Levees with 6-foot crown and 3:1 slopes, estimated for a grade 3 feet above high water of 1903, gives about 117,000 cubic yards from near St. Charles to near Texas Junction, being 11 miles in length; from Texas Junction to and along the Mississippi River to Cuivre River and thence to the bluffs, about 32 miles, 381,000 cubic yards levees along Peruque and Dardenne Creeks, 162,000 cubic yards, or a total of 62 miles of levees—

About 543,000 cubic yards, at 15 cents.....	\$81, 450
62 miles of muck ditches.....	29, 100
62 miles of right of way, 930 acres, at \$50.....	46, 500
Pumping plants.....	30, 000
45 miles of ditches, various sizes (350,000 yards).....	52, 500
Diversion of creeks and Cuivre River (865,000 yards).....	129, 800
Engineering expenses, etc., 15 per cent.....	55, 400

A total approximate cost of..... 424, 750

This would cost about \$5.25 per acre for 80,640 acres in the district.

The value of 80,640 acres, at \$60 per acre, would be about \$4,838,400. If the district would be benefited \$20 per acre, it would amount to \$1,612,800.

All of the above data must be considered as approximate only.

25. *Private drainage district.*—(253–255 R.) (Built.)

Outline of the district is found on map filed, Mississippi River Commission, /881, sheet 87, and is as follows: Commencing at the bank of Mississippi River and mouth of Bobbs Creek; thence along lower side of Bobbs Creek to the Chicago, Burlington & Quincy Railroad embankment; thence south along the railroad right of way to a point about one-half mile above Old Monroe, Mo.; thence in an easterly direction to the bank of the Mississippi River; thence northwardly along the Mississippi River to the point of beginning.

Creech & Woolfolk, attorneys at Troy, Mo., are connected with this district. Unable to see them personally, and mailed them a letter October 6, 1913, requesting necessary information. Mr. Andy J. Brown, highway engineer, Troy, Mo., estimated the drainage system to cost approximately \$3,500. He also stated the majority of the district was excellent land and under cultivation. Average price per acre, about \$75 to \$80.

26. *Cap au Gris levee and drainage district.*—(256–260.5 R.) (Built.)

This is a rather old district, practically all of which is under cultivation. Charles Miller, Winfield, Mo., is a member of the board, but we were unable to see him personally and have written, October 6, 1913, for further information. The general location of the district is in Lincoln County, Mo., and starts about 1 mile below Cap au Gris, Mo., and the levee runs along the main bank back of Sandy Island to near the upper end of the island, or nearly opposite Foley, on the Chicago, Burlington & Quincy Railroad.

The levee is said to be built above the 1903 high water and protects about $4\frac{1}{2}$ miles river frontage and an average distance of three-fourths mile from the river, or approximately 2,100 acres, after which the ground is reasonably high, 445 or more, Memphis datum. The levee appears to stop about the 445 contour. From book 2032, Mississippi River Commission file, elevations taken on top of the levee vary from 444.6 to 445.6, Memphis datum. Top of bank elevations are 438 to 439, Memphis datum. Mr. A. J. Brown, highway engineer at Troy, Mo., stated that the levee was from 6 to 8 feet in height, about 25 feet wide at the base, and withstands high water fairly well. The value of the land in the vicinity appears from various sources to be \$80 per acre or more. The best land was not for sale. It was described as some of the best land anywhere and would raise 80 to 100 bushels of corn per acre, or 40 or more bushels of wheat.

27. *Elsberry drainage district and extension.*—(267–281 R.) (Under contract.) The commissioners are: T. R. Reid, president, Elsberry, Mo.; J. C. Welch, secretary, Elsberry, Mo.; J. M. Gibson, Elsberry, Mo.; J. K. Palmer, Elsberry, Mo.; J. W. Curtney, Elsberry, Mo.; O. H. Avery, attorney, Troy, Mo.

The location of the present proposed drainage district is in Lincoln County and Pike County, Mo.

The project as outlined by Harman Engineering Co., Peoria, Ill., contemplates the complete draining and reclaiming of the land as shown on map. (Miss. River Com., 81, sheets 119–133.) This embraces all of the territory between the bluffs and the main bank of the Mississippi River, with a lower limit near the foot of Sterling Island, or Apex, Mo., on the railroad, and an upper limit near the foot of Slim Island, near Annada, Mo., on the railroad.

Plans for the project were approved and adopted August 21, 1912, and contracts let for the work, excluding pumping plant, in September, 1913, to be begun not later than October 1, 1913, and completed January 1, 1915.

The Harman Engineering Co. have made an extensive survey and submitted a report, profiles and plats to Memphis datum, all of which are on file with the circuit clerk, Troy, Mo. Complete file numbers (Harman file) are in book 7047, Mississippi River Commission file.

This report contained some of the following facts in regard to the district, exclusive of proposed extensions.

The watershed tributary to the Elsberry drainage district that drainage will have been provided for takes in an area drained by Bryants Creek, about 50 square miles; Camp, or Hurricane Creek, about 25 square miles; hill streams between Bryants Creek and Elsberry, Mo., 3 square miles; and the Elsberry drainage district proper, 900 acres, or 30 square miles, making a total drainage area of 108 square miles. Of the 19,000 acres in the district, 4,000 acres are in Pike County, Mo., and 15,000 in Lincoln County, Mo. Complete topographic maps to Memphis datum, contours for

1 foot in elevation, profiles showing grades for levees and ditches for the district, and flood line of the Mississippi River are embodied in this report.

The district is not only damaged by overflow from the Mississippi River, but also from the creeks and hill streams that during periods of heavy rainfall drain large quantities of water into this low land. This water after coming down the bluffs and reaching the valley spreads out and, due to improper drainage, causes the land to be covered with ponds and remain wet and unfit for cultivation the greater part of the year. During the warm summer months a great amount of this water dries out, leaving the land covered with small ponds, soft mud, and high weeds.

While up to the present time this overflow from the bluffs has damaged the land so that its value is about \$1 per acre in lowest spots to \$100 per acre in places near the bluffs, it has also carried down immense quantities of sediment that have enriched the overflowed area so as to make it the best land possible for agricultural purposes after being properly drained.

Mr. Doug. Wells, Troy, Mo., recorder's office, stated that the average value of the valley land at present cultivated was \$25 to \$50 per acre, but that a tract near the bluff and not subject to overflow sold recently for \$200 per acre. He estimated the value of the land when properly drained and leveed would raise to \$125 or \$150 per acre. The soil where now cultivated raises from 80 to 100 bushels of corn and 40 more bushels of wheat to the acre.

The Harman Engineering Co. in its project contemplates the diversion of Bryant Creek at a point near Dameron, then northwardly about $1\frac{1}{2}$ miles and then eastward to empty into the Mississippi River near the center of Mosier Island. The canal would then be outside the levee district and have an estimated base of 40 feet with 1 to 1 slopes and proper grade. The district would be protected along this stretch by levee with 6-foot top, 3:1 back slope and 2:1 front slope, and to be of sufficient distance from the canal. The elevation for the levee above Memphis datum at the proposed outlet of Bryants Creek are on profile as follows: Distance above Cairo, 274.4 miles; elevation surface of ground, 456.2 feet; grade of levee, 459 feet, Memphis datum. The high water of 1903 is given on profile at Hamburg, 272 miles above Cairo, as 452.7, Memphis datum; at Hannibal, Mo., 474.1 feet, Memphis datum, and the high water of 1903 at Grafton, Ill., as 433 feet, Memphis datum.

A diversion canal has also been contemplated for Lost Creek, commencing at a point near Elsberry and running southwardly to the lower end of the district, near Apex, Mo., where the pumping station for the district is to be built.

The levee along the Mississippi River was designed to have a 3-foot crown, back slope and 3:1 front slope. A section of the proposed levee and the one now in existence is shown on Harman Engineering Co.'s profile, and scaled from the cross section the old levee has 3-foot top, 2:1 slopes, and is about 4 feet lower than the proposed levee. The proposed elevations, Memphis datum (taken from profile), and the Mississippi River levee are as follows:

At Bryants Creek=0 on profile, ground 456.2, levee grade.....	456.2
At station 160 (stations 100 feet), ground $\begin{cases} 448.4 \\ 452.7 \end{cases}$ levee grade.....	452.7
At station 320, ground $\begin{cases} 451.1 \\ 446.4 \end{cases}$ levee grade.....	446.4
At station 538, southern end of levee, ground $\begin{cases} 445.0 \\ 449.7 \end{cases}$ levee grade.....	449.7

Slope is given as -0.0112 per cent.

The Harman Engineering Co.'s estimates of cost were given as follows:

Mississippi River levee, 294,500 cubic yards, at 20 cents.....	\$58
Ditches, laterals, and levees, including Mississippi River levee, approximately 1,400,000 cubic yards, at 10 cents to 12.5 cents and 20 cents per yard.....	193
Railroad damages.....	7
County bridges.....	9
Private bridges.....	3
Pumping plant, engineer dwelling, sluiceway, etc.....	80
Right-of-way damages.....	29

Estimated total cost..... 324

Report filed January 15, 1913, circuit court, Troy, Mo.

In assessing damages about \$30-\$50 per acre was allowed. In report on this district the benefits for drainage was given as \$974,344, with damages amounting to \$29. The Harman Engineering Co.'s report gives in detail the damages and benefits.

assessed. This shows that the benefits derived from drainage and levees in the district will be three times the estimated cost of construction.

Bonds have been issued and contracts let for the construction of about 1,568,000 cubic yards of earthwork, being approximately 13 miles of levee on the east and south sides of the district, the Bryants and Lost Creek diversion canals, and all necessary laterals.

An extract from the Elsberry Democrat (see file M. R. C./881, sheet 87) gives the names of bidders for the different sections and also states that this is the largest project of its kind in this section of Missouri and the second largest in the State, and will not only prove of incalculable benefit to the community, but will add materially to the wealth of eastern Lincoln and southeastern Pike Counties.

On Harman Engineering Co.'s sheets (files 285038 and 285039) they show lands annexed to the Elsberry district. From reports in that vicinity it is proposed in the near future to extend the district to take in the land north as far as Clarksville and south to near Foley, or the upper limits of Cap Au Gris district.

28. *Sny Island levee drainage district.*—(282–325.5 L.) (Built.) Commissioners: H. Koeller, president, New Canton, Ill.; H. E. Seehorn, secretary, 1037 North Eighth Street, Pittsfield, Ill.; J. C. Gay, collector, Rockport, Ill. Officers: J. R. Easley, treasurer, New Canton, Ill.; E. J. Chamberlain, engineer, Pittsfield, Ill.; Anderson & Matthews, attorneys, Pittsfield, Ill.

The district lies in Calhoun, Pike, and Adams Counties, Ill., and embraces 110,000 acres of very fertile bottom lands, valued at \$125 per acre. The levee was built in 1872 to 1875 and is the longest and most efficient of the upper Mississippi River levees.

Beginning at Hamburg Bay, near Mosier post office, Ill., the levee follows closely the east bank of the Mississippi to Bluff Hall, Ill., a distance of 52.1 miles. The limits of the district are the levee and the limits of the 1851 overflowed land.

The internal drainage system is carried through the Sny, a channel which runs through the middle of the district for practically its whole length. From the time of its construction (1875) to 1888, 18 crevasses occurred, but the levee was later raised, and from that date to 1903 there were no more breaks. During 1903 there was a destructive crevasse opposite Louisiana, Mo., but none have occurred since. The United States has to date contributed \$100,000 toward the repair and strengthening of the levee.

The levee was originally built with the following section: Outside slope 3:1, inside slope 2:1, crown 4 feet, with a 4 by 4 feet muck ditch, but the levee was raised from 4 to 5 feet in 1892 and built to the following section: Outside slope 3:1, inside slope 5:1, and crown 6 feet.

The Memphis datum elevations along the top of the levee now are as follows:

	Mile.	Feet.
Upper end.....	0.0	484.3
Opposite Hannibal bridge.....	6.8	481.6
Southwest corner township 4, range 8 west.....	12.0	479.2
Crevasse No. 4.....	17.0	476.0
Crevasse No. 1.....	24.0	473.0
Anal slough crossing.....	28.4	271.9
Opposite Louisiana bridge.....	34.0	468.8
Iowa cut-off.....	40.0	464.8
Crevasse No. 12.....	47.4	460.3
Lower end, 7 miles above Hamburg.....	52.1	457.8

These elevations indicate that the levee is now about from 2.5 to 3.5 feet above the high-water stage of 1851.

29. *South River levee district.*—(331–341 R.) (Built.)

Commissioners: L. C. Hendren, Hannibal, Mo.; Lee Frazer, collector, Palmyra, Mo.; John Bross, address unknown.

The general location of this district is in Marion County, Mo., with lower end 2½ miles above Hannibal, Mo. The district has been constructed under the direction of L. C. Scheetz, engineer, Palmyra, Mo., and has been in operation since December, 1904. It embraces all of the territory between the bluffs and the bank of the Mississippi River, with a lower limit about 2½ miles above Hannibal, Mo., and an upper limit along the lower side of South River. See map, file M. R. C./881, sheet 91.

From conversation with H. C. Scheetz and from file M. R. C./881, sheet 91, the following data was obtained: The levee line was surveyed about 1902 and 1903, and during 1903 the high water covered most of the district to a depth of from 6 to 10 feet. On blue print M. R. C./881, sheet 117, Mr. Scheetz gives figures as taken by him with a

skiff of the surface of the ground below high water of 1903. This was used as a basis for assessing benefits, and land covered with 6 feet of water was assessed \$16 per acre, 8 feet \$18, and 10 feet \$20.

Mr. Scheetz's record for 1903 high water was on June 7, which agrees with M. R. C. date of June 8 at Hannibal. So far as can be ascertained, the profiles are not referred to any particular datum plane, but his levees were built to a grade of 3 feet above 190 high water, using his elevations.

Profiles in 15 sheets, M. R. C./881, sheets 207-221, give the surface elevations, grade of levee, high water 1903, length and yardage required, and other data pertaining to the construction of the levee. Cross sections of the levees are given in M. R. C./881 sheet 91.

The area protected in the district is approximately 10,200 acres.

In a proposed project covering practically this same levee district submitted in report June 20, 1897, by Lieut. Col. W. R. King, Rock Island engineer office, he gives the area subject to overflow as 11,360 acres. He also states the district is very rich bottom land, the most of which is covered with heavy timber. A profile to Cairo datum showing elevations along Mississippi and South Rivers with a proposed levee grade about 3 feet above 1888 high water is given.

Mr. Waldron, weather bureau local forecaster, Hannibal station, stated that just a few years back a large part of low ground in the South River drainage district was offered to hunters for about \$5,000. Later, parts of it were bought by William Mungo for about \$3 per acre, and levee improvement commenced. Mr. Lee Frazer, commissioner, stated that the average value at present is from \$65 to \$70 per acre, and some is worth \$100; that there was about 13 miles of levee in the district which has cost to the present time approximately \$265,000, including a pumping station located at lower end of the district, worth \$40,000. The original cost was about \$15 per acre but enlargement of levee and incidentals have brought the cost to approximately \$20 per acre.

Good crops have been raised regularly since the levee has been built, and corn averages 70 to 80 bushels and wheat 20 to 35 bushels to the acre.

The cross section of the levee along the Mississippi River as originally built, except the crossing at Bay St. Charles, is given on M. R. C./881, sheet 91, and was constructed with a 6-foot crown, 2:1 back slope, and 3:1 front slope, with a 20-foot berm on either side, and an average height of 10 feet, the outside toe of the levee to be 10 feet or more from the top of the bank of Mississippi River.

Later, parts of this levee were strengthened by a banquette on the inner side having a base of 30 feet, a height of about 3 feet at the inside edge of the enlargement and sloping up to a point about one-half the height of the old levee.

The levee across Bay St. Charles was built on a rock fill base with a 6-foot crown, 3:1 river slope, and 4:1 back slope for about 5 feet below the top, where a 30-foot wide banquette is built and used as a county road, after which the slope is 2:1 to the natural surface of the ground. Parts of the levee have been revetted.

Mr. Hedd, of the Hannibal-Missouri Land Co., stated the levee was in first-class condition and that most of the land is now under cultivation. During the construction of the Mississippi levee parts of it were built over sandy foundation, and to avoid seepage muck ditches were built about 3 to 4 feet wide and deep enough to reach good gumbo soil. The ditches ranged in depth from 3 to 10 feet, were filled with good soil, and have given entire satisfaction. The cross section of the levee along South River is shown on M. R. C./881, sheet 91, and was constructed with a 6-foot crown, 2:1 slopes, and 20-foot berms, the outside toe of the levee to be 140 feet or more from the bank of South River. The highest stages of the Mississippi River in this vicinity can be found in Table No. 2, Mississippi River Commission report, 1912.

NOTE.—An area of about 2,400 acres (Lieut. Col. King's report) subject to overflow between South River and North River, lies just above this district and below Marion County drainage district. The land is principally swamp and heavy timber, and no drainage has been proposed for its drainage. From the statements of several residents it would be expensive to drain in proportion to its area, as it is subject to overflow from North, South, and Mississippi Rivers.

30. *Marion County drainage district.*—(342-344 R.) (Under construction.) The commissioners elected March 8, 1913, are: Jerry T. Hansbrough, Palmyra, Mo.; Charles M. Swain, Palmyra, Mo.; E. Scott Fogle, Palmyra, Mo.; Louis C. Ahland, Palmyra, Mo.; W. E. Eberhardt, Palmyra, Mo.; attorney, Benj. F. Glahn, Palmyra, Mo.

The location of this proposed, and now under construction, drainage district is in Marion County, Mo., between North River and South Fabius River.

Plans and maps showing proposed drainage system, levees, and topography of the district were submitted to the commissioners in March and April, 1913, by Edmund T. Perkins Engineering Co., of Chicago, Ill. It includes all of the land between

bank of the Mississippi River and the bluffs, with a lower limit at North River and an upper limit near the lower bank of South Fabius River.

The Perkins Engineering Co.'s report, on file in office of circuit court, Palmyra, Mo., gives profiles, grades, estimates, and other data for the complete draining and leveeing of the district. The report is a court record and could not be obtained. A request has been sent to Perkins Engineering Co. for this data. (Received, 1797-148.)

All the elevations are referred to Memphis datum, contours 1 foot in low land and 5 feet on bluffs; but the following notation is on the map: "Level base, Memphis datum plane adjusted to correction on West Quincy B. M. by the U. S. Geological Survey in 1907. Correction equals +1.3 feet. Elevation of zero at Quincy gauge, 466.18 M. R. C. corrected. Elevation of zero at Quincy gauge, 458.05 feet above sea level.

"Elevation high water at Quincy pump station, 1851, 488.75 M. R. C. cor.; elevation high water at Quincy pump station, 1903, 486.83 M. R. C. cor.

"High-water stage, 1851, 22.6; 1903, 20.7. Elevation of 1903 high water near mouth of South River, 482.3 feet." File, M. R. C., /881.

Lieut. Col. King's report, 1897, states that practically this same area contains about 480 acres of rich bottom land subject to overflow, a great part of which is cultivated. He estimates the increased value of this land would have been about \$89,600 if his proposed levees had been built.

The estimates for the present district, as given by Perkins Engineering Co., are as follows:

Topographic maps.....	\$1, 834
Organization.....	2, 500
Levees and ditches.....	80, 250
Eastern Slough fill.....	1, 500
Main tile drainage.....	17, 500
Machinery at pump house and installation.....	15, 000
Pump house, etc.....	7, 500
Engineering expenses and supervision.....	6, 088
Value of property taken.....	7, 226
Damages.....	6, 340
Attorneys' fees.....	2, 500
Clerk fees, office expenses.....	2, 717
Accidentals.....	3, 500
Total cost estimated.....	154, 455

In the assessment for damages and benefits, the benefits assessed were \$268,617; value of property taken for right of way, ditches, etc., \$7,226; and total damages, \$340. This shows the total cost to be 57.5 per cent of the total benefits. In assessing damages the assessors allowed about \$25 to \$35 per acre.

A typical section of the levee to be built along the lower side of South Fabius River is a crown of 3 feet, 2:1 back slope and 3:1 river slope, the grade to be 3 feet above the flood line of the South Fabius River and the outside toe of the levee to be 110 feet or more from the bank of the river. Borrow pits are on the river side of levee, but pits should not be so close as to be intercepted by the 3:1 outside slope of levee produced. A profile of this levee shows the surface of the ground to be 477 to 481 M. D. from near the mouth of South Fabius toward the bluffs, a distance of 12,450 feet. At a point about 6,000 feet from the bluffs the levee will be 12 feet; at Dunsford the grade line crosses the Chicago, Burlington & Quincy Railroad, 5.5 feet above the railroad tracks; at the bank of the Mississippi River the grade is given as 487.6 feet Memphis datum. The high water of 1903 is given at Dunsford as 484.7 feet Memphis datum, and 1912 high water as 482.56 Memphis datum. The elevation of Mississippi River Commission bench mark 98/3 is given as 480.3 feet, while the same bench mark is given on Mississippi River Commission published maps as 479.05 feet.

The levee along North River has the same cross section as the South Fabius River levee, with a grade line 3 feet above flood line of North River. The profile shows the levee to be 13,000 feet in length, with an average fill of 9.5 feet the grade at the Chicago, Burlington & Quincy Railroad, near North River station (at bluffs), to be 479 M. D., or same elevation as railroad tracks; at the Chicago, Burlington & Quincy Railroad, near the mouth of North River, the grade is 487.1 feet M. D., or about 3 feet above the railroad embankment; at a point where it crosses Eastern Slough and connects with the levee along the Mississippi River the grade is 485.9 feet M. D.

The levee along the Mississippi River is to have a 5-foot crown, 2:1 back slope, and 3:1 river slope, the grade to be 3 feet above 1903 high water, the outside toe of the levee to be 120 feet or more from the bank of the Mississippi River, and borrow pits

to have same restrictions as on South Fabius River. When the levee is over 10 feet high or on sandy foundation muck ditches are to be constructed 3 feet wide and 3 or more feet deep. The profile shows a length of 14,300 feet, with an average height of 11 feet; the grade at Dunsford to be 487.6 feet M. D. (high water of 1903, 484.7); and the grade at Eastern Slough to be 485.9 feet M. D. (high water, 1903, at South River 482.3 feet M. D.).

The levee has a slope of 0.00012 foot per foot, or 0.63 foot per mile. The area inclosed in the district is given as 4,013 acres, which the map shows to be practically all cultivated, and valued at about \$50 per acre, which after improvements are built will be worth about \$80 to \$100 per acre. Articles of association were filed December 31, 1912, and work was commenced on ditches and levee construction September, 1913.

The pumping plant is to be of the centrifugal type for high stages and sluiceways for water to drain out at low stages. The plant is to be near Eastern Slough and Mississippi River. For a report submitted by Lieut. Col. W. R. King, covering practically this same territory, giving profiles, proposed levee grades, etc., see M. R. C. file 881 or House of Representatives Document 244, Fifty-fourth Congress, second session.

31. *Fabius River Drainage District*.—(344-349 R.) (Proposed.) Supervisors: Pete Simon, Quincy, Ill.; E. H. Hogge, Quincy Ill.; W. M. McConnell, Quincy, Ill. John A. Dearing, Taylor, Mo., attorneys: Schofield & Plowman, Hannibal, Mo.

The district as proposed is located opposite Quincy, Ill. It includes all the land from the Mississippi River to the bluffs, with a lower limit along the South Fabius River, or upper line of Marion County drainage district, and an upper limit along the Marion County and Lewis County line. The district as outlined in file 6083 circuit court, Marion County, Palmyra, Mo., contains about 11,181 acres. Article of association were filed July 7, 1910, and decree offsetting objections to the formation of the district was handed down by Judge Wm. T. Ragland and thereby formed organized, and incorporated the district May 5, 1911. The suit was carried to the supreme court and the district organization affirmed October, 1911. (Filed March 21, 1912.)

So far as could be ascertained from testimony in W. T. Rutherford's (referee) report no work in actual canal or levee construction has been done, except small projects by individual farmers, which have been practically worthless. In the above report Henry C. Scheetz, engineer, Palmyra, Mo., testified that about two-thirds of the land is covered with water at extreme high stages. Mr. Heather testified one-third of the land could not be used for cultivation, and that the sloughs 4 miles from the river rise and fall as a result of seepage. W. P. Bushnell, engineer at Quincy, Ill. Harman Engineering Co., Peoria, Ill., and H. C. Scheetz, Palmyra, Mo., stated that they had made no extensive survey, but merely looked over the ground. Jacob A. Harman testified that the system could be built for less than the benefits, and about 10,000 acres would be good land, excepting old beds of diverted streams.

Mr. O'Brien of this office (Mississippi River Commission) reported that he four plats of survey made of this district at Harman Engineering Co., Peoria, and request has been made by this office for same October 6, 1913. Received and filed M. R. C. 881, Sh. 222-230.

In Lieut. Col. King's report, 1897 (file M. R. C./881), the area subject to overflow between the North and South Fabius Rivers is given as 4,960 acres, most of which is swamps and heavy timber and thinly settled. No estimate was given for leveeing this area in his report.

Mr. M. Meigs in this report states the North Fabius River is the largest of the four between La Grange and Hannibal and is a river which in times of flood pours an immense quantity of water into the Mississippi River, and often inundates the whole country nearly to La Grange. Small attempts at levee building have been made near the bluffs, but are weak and often overtopped by floods. He stated the North Fabius and South Fabius drain about 1,000 square miles of territory and that no provision for levees was made between the two Fabius rivers, as it was an inconsiderable area of swampy, wild land which at that time seemed useless to take into account.

Residents near West Quincy, Mo., stated the vicinity was covered almost yearly with sometimes as much as eight feet of water. A large part of the land in this vicinity was bought by a hermit years ago, and very cheap. It is partly cleared and rather low. Corn was cultivated in places.

Mr. Schofield, of Schofield & Plowman, attorneys, at Hannibal, Mo., is attorney for this district and he stated that the district contained about 11,000 acres, that the organization of the district had just been affirmed by the Supreme Court, and no actual estimates of grades or cost had been submitted, but that they expected the total cost of the district improvements to be about \$35 per acre, as proposed by Harman Engineering Co. He stated that a suit is now in court to extend the district to near Durgan.

Sturgeons Creek and compel the property owners in Lewis County to joint the district, and if this was successful they intended to extend the district to near La Grange. They propose to straighten South Fabius River to conform more or less to the upper levee of the Marion County drainage district and divert the North Fabius from a point near Taylor Station, following the foot of the bluffs until the South Fabius River was reached, into which all the water would be drained.

Preliminary estimates for this part of the work was submitted by H. C. Scheetz, as follows:

The section of the canal on the upper end to have about 150-foot base, 200 feet at top, with about 18 feet cut and an area of 135 cubic yards per linear foot. This is to be lined on both sides with a levee having a 10-foot crown, 3:1 slopes, and about 7 feet high.

Where the canal is nearer South Fabius River the section has 150-foot base, 220 feet wide at top, about 12-foot cut, and an area of 82 cubic yards per linear foot. The canal to be lined on both sides with levees having a 10-foot crown, 3:1 slopes, and about 6-foot fill.

The profile showed 2,723 feet of 18-foot cut, 3,144 feet of 16-foot cut, 2,543 feet of 14-foot cut, and 6,265 feet of 16-foot cut, making a total length of about 14,500 feet of cut, with a total estimated yardage of 1,285,800 cubic yards. The slope proposed was 3 inches fall in 1,000 feet. Mr. O'Brien, while at Peoria, Ill., found the Harman Engineering Co. had a detail map and profile of proposed improvements in this district. The section of the levee proposed was 6-foot crown, 3:1 and 2:1 slopes. See M. R. C. file 881, sheets 222-230.

This office has requested more data from Harman Engineering Co. in regard to this district.

NOTE.—A survey and report covering the west bank of the Mississippi River from Hannibal to La Grange, Mo., made under the direction of Lieut. Col. W. R. King (28.5-356.5 R), giving elevations and proposed grades and estimates of cost for levees, with other data, can be found in House Document No. 244, Fifty-fourth Congress, second session, M. R. C. file 881. He states the advantages to be derived from the proposed levees as a protection to land subject to overflow would be to probably increase the value of the land to a much greater amount than the estimated cost of the work, but is of the opinion that the construction of such levees as proposed would not be of any benefit to navigation. Opinion concurred in by A. Mackenzie, Acting Chief of Engineers.

In the estimates submitted in this report the total cost for artificial bank or levee from La Grange to Hannibal is given as \$341,761, while the total probable increase in value of land was estimated at \$703,200, which is much greater than the total estimated cost.

2. *Indian Grave levee and drainage district.*—(350-362.5 L.) (Built.) Commissioners: William Graisser, secretary, Quincy, Ill.; Henry Vahle, president, Quincy, Ill.; Arthur Weber, Ursa, Ill.; John T. Ingram, attorney, Quincy, Ill.; Harman Engineering Co., engineers, Peoria, Ill.

This district is in Adams County, Ill. The limits of the district are as follows: Beginning at the foot of the bluffs about $2\frac{1}{2}$ miles above Quincy, Ill., thence following along the levee across Quincy Bay about $1\frac{1}{2}$ miles in a southwesterly direction, thence continuing along the levee about 9 miles up the bank of Canton Chute to Hughton Landing, thence continuing along the levee about 3 miles in a northerly direction behind Indian Grave and Long Lakes to Bear Creek ditch, thence continuing along the levee about $3\frac{1}{2}$ miles in an easterly direction to the bluff, thence along the foot of the bluff about $9\frac{1}{2}$ miles in a southerly direction to a point $1\frac{1}{2}$ miles above Quincy, Ill., the point of beginning.

There are 17,925 acres of land benefitted, all tillable, and worth approximately \$500 per acre.

The levee district was established in the early seventies, and combined with the drainage district in 1880. The levee is built to a height corresponding to an elevation 2 feet above the high-water stage of 1903, and has the following section: Outside slope, 3:1; crown, 6 feet; inside slope, 2:1 and 2.5:1. It is about 21 miles long, cost originally \$13,000, and requires raising and strengthening to withstand a flood of a height equal to that of 1903, when 6 crevasses occurred, which washed away 3,000 feet of levee. Damage to stock, crops, buildings, etc., by overflow in that year was \$270,000, and cost of repairs to levees was \$10,000. (No map or profile of this district in secretary's office to date, Oct. 31, 1913.)

3. *Lima Lake levee and drainage district.*—(363-368 L.) (Built.) Officers: Col. John H. Best, president, Quincy, Ill.; John Ensminger, Lima, Ill.; James Bragg, Peoria, Mo.

This district was established in 1886 and lies in Adams County, Ill. The levee of this district is 10 miles long, and when built the top was 2 feet higher than the high water of 1851, though it has shrunk considerably since then and has been damaged to a considerable extent by high water. There is no profile of the levee available. The original cost of the levee was \$94,000 and the annual cost of maintenance is \$3,125. In 1903 the levee broke, entailing an estimated loss to crops, stock, and buildings of \$210,000, and \$9,000 for repairs to the levee.

There are 14,000 acres of land protected in the district, of which 10,000 acres have been improved. The value of the land in the district is estimated at from \$10 to \$100 per acre, according to location and improvements thereon. The lower limit of the district is a levee along the north bank of Bear Creek from the bluff to the Mississippi River, thence following up along the bank of said river about 5 miles to the Adams-Hancock County line, where it connects with the levee of the Hunt levee and drainage district. The Adams-Hancock County line is the northern limit of the district and the bluffs the eastern limit.

Some of the drainage from the Hunt levee and drainage district is carried into the district, and then all is carried into Big Slough and thence to the lower side of the district, where at high water it is pumped into the Mississippi River.

34. *Hunt levee and drainage district.*—(368-380 L.) (Built.) Commissioner Joseph Fry, chairman, Warsaw, Ill.; W. C. Van Pappeldan, Warsaw, Ill.; R. B. Johnson, Warsaw, Ill.

The Hunt levee and drainage district in Hancock County, Ill., has an area of 15,500 acres, at a present value of \$55 per acre; 75 to 80 per cent is now under cultivation. There is about 10.5 miles of levee in this district, constructed during the seventies, of poor material and section, and has broken at various places during flood years. The cost of repairs to breaks in 1903 was \$8,762, and the annual cost for maintenance \$4,500. The levee is now in fairly good shape to stand an ordinary flood, but, as the elevations of its top will show, needs to be raised. There is still due about \$2 per acre to complete payment for the levee and drainage system, which originally cost \$102,380. There has been spent about \$12,000 for drainage purposes, but it has been done from time to time and without system. At present there is a ditch proposed down the length of the district, and the commissioners are considering having their engineer Mr. Webb P. Bushnell, Quincy, Ill., locate lateral ditches over the district.

There was no profile of the district to be had, but the following heights of levee above the flood stage of 1903 was noted by the commissioners at various stations, a "station" being 100 feet:

Station 0 equals upper end of levee, 4 feet above high water, 1903; station 120, 4 feet above high water, 1903; station 220, 0.8 foot above high water, 1903; station 530, 2 feet above high water, 1903; station 568, at Hancock, Adams County, 2 feet above high water, 1903.

A map of the district is in the office of the secretary of the Mississippi River Commission.

35. *Gregory district.*—(367-380 R.) (Not organized.)

The general location of this district is in Lewis and Clark Counties, Mo., and consists of the territory between the Mississippi River and the bluffs and from the vicinity of upper end of Tully Island to the lower side of Fox River or Des Moines-Mississippi levee district No. 1.

Mr. William Reddick, of Gregory, Mo., is a large landowner and interested in the general welfare of this locality. There has been no organized district, and the levees now in place are private and do not withstand high water. The district is not only subject to the Mississippi floods, but also from Fox River and Sugar and Honey Creeks. This office has written Mr. Reddick for further information.

A survey was made of this district under direction of Lieut. Col. W. R. King (January 1897), Rock Island United States engineer office, and printed as House of Representatives Document No. 223, Fifty-fourth Congress, second session, M. R. C. file 88. Profiles are given showing surface of ground, present levees, and proposed grade along Honey and Sugar Creeks and Fox River and along the Mississippi River from near Alexandria to near head of Tully Island. From this report the following data were obtained:

The Gregory district contains 21,500 acres of rich bottom land, subject to overflow. Small private levees have been built along the lower side of Fox River, along upper part of Honey Creek, and along the Mississippi River in the vicinity of Gregory, Mo. Cross sections are shown, and the cross section at Gregory shows 4 feet crown, 3:1 slopes, and 2 feet below 1892 high water.

All the proposed levees were to be built with a 4-foot crown, 3:1 slope on the river side and 2:1 on the land side. The grade of the levee along the Mississippi River was to be 3 feet above 1892 high water, which would give an average height of 8 feet.

feet, have a yardage of 577,521 cubic yards, estimated at 15 cents per yard, making a total cost of \$86,628 for levee work.

One hundred and seventy thousand five hundred and fifty-two cubic yards of earthwork was estimated to repair old levee along south side of Fox River, and 15,000 yards necessary for excavation of old bed of Fox River, making 185,552 yards of earthwork at 15 cents, \$27,833. Two outlet sluices of masonry, 252-foot openings, one at Fox River and the other at Canton, \$40,000; new railroad bridge, \$10,000; changing county bridge, \$4,000; and engineering, 15 per cent, or \$25,039, making the total cost of proposed levees \$193,500. Lieut. Col. King estimated that a thorough levee protection would increase the value of the district about \$20 per acre, or \$430,000, which shows that at that time the cost of the levee as proposed would be less than half the value of the land after construction.

No estimates were made for damages, as it was expected that the land necessary for levees would be donated. The farm lands were estimated as worth from \$25 to \$50 per acre, and 80 bushels of corn and 40 bushels of wheat were not unusual crops.

Mr. M. Meigs in his report stated: "I find a great diversity of opinion among the owners of the land along the bottoms, many holding that the damage from seepage and rainfall restrained by the levees from flowing off, more than counteracts the benefit derived from the protection of the land against the occasional occurrence of high water. Farmers told me that they lose about one crop in seven by high water from the Mississippi, and that the benefit to the land from silt deposited more than compensates for the loss of an occasional crop. The June rise, which usually is the one most feared, does not always occur, and even when it does it frequently drains off in time to plant and mature some one of the many different crops for which the land is well adapted."

The fear of seepage and rainfall as expressed above is no longer considered in the new drainage system, as the pumping plants take care of all the water of this class, as to the necessity of the silt deposit, the district just above this, called the Des Moines Mississippi levee district No. 1, has kept out the high water, and no apparent depreciation of the land can as yet be noticed; the corn in places this year is expected to run 100 bushels to the acre.

36. *Des Moines-Mississippi levee district No. 1.*—(380–381.5 R.) (Built.) Board of supervisors: W. E. Bates, president, Alexandria, Mo.; I. B. Kerr, secretary, Alexandria, Mo.; B. W. Harter; Samuel Hammond; H. I. Sawyer, attorney, Keokuk, Iowa; C. T. Llewellyn, attorney, Kahoka, Iowa.

The location of this district is at Alexandria, Clark County, Mo. This project covers what was formerly known as the Egyptian Levee, on the lower side of the Des Moines River.

The present levee district consists of the land from the Mississippi River, including Alexandria, Mo., to the high sand ridges near the bluffs, with a lower limit along the upper side of Fox River to the lower side of Alexandria and an upper limit along the lower side of the Des Moines River. Blue-print map filed M. R. C./881, sheet 118. A survey of the Des Moines River (M. R. C./857 file), on sheets 1 and 2, covers a larger part of this district. This levee district consists of practically the same area as the Egyptian district, which contained about 11,000 acres of cultivated land subject to overflow. The Egyptian district, because of financial troubles, was disbanded and the present one organized January 30, 1904.

The work of building and repairing the levees under the new organization was begun during 1904 and completed in 1905. Mr. W. E. Bates, president, stated the district had not been overflowed since the levee has been in operation; that the levee enclosed approximately 11,500 acres of first-class land, and the cost to the property owners was about \$135,000.

The value of the land was about \$50 per acre before levees were built, but the present value is \$100 or more per acre. The district has no pumping plant, but can drain surface water to an elevation of 496 feet M. D. During wet seasons and high stages the land below 496 M. D. is subject to seep water. The granitoid walks in the northern part of the town of Alexandria are built 2.5 to 3 feet above the surface of the street because of seepage. The levee along Des Moines River has been built in some places, where the upper soil is surmounted by a layer of fine sand, about 8 feet below surface. This washes out from under the levee and causes considerable trouble. During 1892 Mr. Bates estimated the district was covered by 2 feet or more of water. During 1903 Mr. I. B. Kerr, secretary of the district, stated the water was 3.5 to 4 feet above the land near his house, about 2 miles back of Alexandria. The highest water record at Nashville, Iowa (393.6 miles above Cairo), was 508.43 feet mean Gulf level on May 17, 1888, and the highest at Hannibal, Mo. (329.4 miles above Cairo), 471.47 feet mean Gulf level on June 8, 1903.

Lieut. Col. King covered this district in his report in 1897, file M. R. C./881, and submitted profile of old Egyptian Levee. The cross section of this old levee is shown with a 4-foot crown and 2:1 slopes and all elevations are given in Cairo datum. He stated that the district had been long settled and extensively cultivated; that it was protected along Des Moines River by the Egyptian Levee and along the Fox River by the Fox Levee, but had no protection along the Mississippi River. The levees at that time were of good dimensions and probably strong enough for their purpose provided the so-called Egyptian Levee was protected from the erosion of the banks of the Des Moines River.

During 1904 the district was resurveyed and profile and maps made to Cairo datum. The levee along the Des Moines River (file M. R. C./881, sheet 180) has a length of 47,150 feet with an average height of 8 feet. The surface of the ground, old surface of levees in place, and grade line 3 feet above 1903 high water are shown. Elevation 1903 high water is given as 517.4 feet, Cairo datum, near upper end of Alexandria and 532.8 at point near bluffs.

Mr. Bates stated the levee had been raised about 3 feet above the old Egyptian Levee near Alexandria and about 1.5 to 2 feet above old levee near upper end. They have found the upper end somewhat low and expect to commence work of raising it about 1.5 feet, at an approximate cost of \$5,000. The present levee has a 5-foot top, 2:1 slopes, except in some places 3:1 on the river side, with an average height of 8 feet. At the upper end the levee has been strengthened and protected by riprap and in other places where the river threatens the levee it has been protected by dikes. Lieut. Col. King estimated 14,000 linear feet of shore protection, at a cost of \$35,000, was necessary at that time to protect the shore along Des Moines River.

The levee along the Fox River is given in Lieut. Col. King's report with a 3-foot crown, 2:1 slopes, and about 4 feet high. At present it has a length of 33,127 feet, grade of 3 feet above high water, an average height of about 9 feet, 5-foot crown, and 2:1 slopes. Elevation of high water near bluffs is given as 529.7 feet C. D., and K. & W. R. R. back of Alexandria as 515.1 feet C. D.

The levee along the front of the town of Alexandria has a length of 7,000 feet, elevation of about 517 or 518 feet C. D., and is about 4 to 5 feet high, with a 3-foot crown, and about 2:1 slopes. A 42-inch automatic gate opening into Fox River and three 24-inch gates opening into Keg Slough take care of the surface water and drainage at present, but have not proved satisfactory. Pumping plants at or near these locations are contemplated in the near future.

Mr. Kerr stated an average crop of wheat was from 25 to 35 bushels to the acre and corn averaged 75 to 90 bushels, but expected corn to run 90 bushels this year.

37. *Private levee district.*—(381.5–382.5 R.) (Proposed.)

Located just above the mouth of Des Moines River. The project is a private enterprise of five or more farmers and not as important as other districts considered in this report.

Mr. A. L. Parsons, 22 North Fifth Street, Keokuk, Iowa, is most interested in this district.

They propose to build a levee of small cross section with an average height of 4 feet, on approximately the location shown on M. R. C./881, sheet 109. The area enclosed is expected to be about 700 acres.

Plats, profiles, and estimated costs could not be obtained. This office has written Mr. Parsons but has received no reply to date (Oct. 21).

38. *Territory Montrose to Fort Madison, Iowa.*—(397–404 R.) (Problematical.)

This is a large cultivated district in which nothing but private levees have been built by individual farmers.

Due to the construction of the Keokuk Dam by the Mississippi River Power Co. Keokuk, Iowa, the flood plane, or rather the backwater, will submerge the lower parts of this area. Maps on file in Stone & Webster Engineering Co.'s office at Keokuk, Iowa, give the flood plane as located by them. Mr. J. O. Boyd, attorney for Stone & Webster, stated that all property below or slightly above contour 525 M. D. on Mississippi River charts was expected to be submerged. As the dam was completed about July, 1913, the high-water slope has not been actually ascertained.

A profile made by the Mississippi River Power Co. gives surface slopes of the Mississippi River from near New Boston to Keokuk and the estimated surface of backwater from the dam for a discharge of 372,000 second-feet shows a water surface elevation at the dam of 525 feet M. D.; Montrose, Iowa, 525.85 feet; and Fort Madison, Iowa, 528.05 feet. See M. R. C./881, sheets 99–100. Scaling the area roughly from M. R. C. charts, using contour 528 at Fort Madison and 526 at Montrose, there would be about 6 square miles of country submerged, including islands, provided levees are not built.

Mr. J. C. Brewster, of Fort Madison, is connected with small private levee districts below Fort Madison.

39. *Territory Fort Madison to Burlington, Iowa.*—(409-423 R.) (Problematical.)

The topography over this entire area has been taken by Stone & Webster Engineering Co. for the Mississippi River Power Co. and is on file as Green Bay District-Skunk River Delta. (M. R. C./881, sheet 95.) The power company has purchased a large portion of the lower part of this district, as it will be affected by backwater from the Keokuk dam.

Mr. J. O. Boyd, attorney for Stone & Webster, stated the water would reach about 526 feet M. D. As shown on the power company's profile the surface of backwater from the dam for discharge of 372,000 second-feet, or, to correspond with 1888 high water, would be 528 feet M. D. at Fort Madison, Iowa, and 536.2 feet M. D. at Burlington, Iowa (file M. R. C./881, sheets 98 and 99).

The map of the power company shows small private levees in the lower end of the district, built to about 526 M. D. Near the center of the district private levees, some of which are shown on M. R. C. inch-mile chart No. 117, and all are shown on power company's plat M. R. C./881, sheet 95. They show the levees are built to 526 and 529 M. D. along the Mississippi River, but are not continuous and not high. Along the lower bank of Skunk River a levee has been built from the Mississippi River to the highlands near the bluffs.

The power company tried to organize a levee district in this locality and proposed to bear the largest part of the expense, but could not induce property owners to join in the project. Mr. Boyd stated that the company might at some future time build a levee and redeem their submerged land.

Lieut. Col. King, in his report on part of this district from Skunk River to Fort Madison, December, 1896, gives profile along lower side of Skunk River with proposed grade of levee 3 feet above 1892 high water, grade being 556.65 C. D. at bluffs and 548.82 C. D. near head of Peels Island, the estimated yardage being 221,850 cubic yards, and length 42,200 feet. In his estimate he also gives profile from head of Peels Island to near Fort Madison with proposed grade 3 feet above 1888 and 1892 high waters, the length being 53,065 feet, yardage 671,716 cubic yards, grade at upper end 548.82 feet C. D., and at lower end 544.48 feet C. D., with an average height of about 11 feet. The power company estimate their grade to be 2 feet above 1888 high water at Fort Madison and the same as 1888 just below Burlington, so the levee under present conditions would have to be raised to be safely above new water surfaces.

Lieut. Col. King estimated 15,600 acres subject to overflow between the Skunk River and Fort Madison. This would be increased somewhat, due to new water surfaces. Lieut. Col. King's estimates were for a levee with a 4-foot crown, 3:1 slope on the river side, and a 2:1 slope on the land side. The average height for the entire 8 miles of levee was estimated at 9 feet. All earthwork was estimated at 15 cents per cubic yard, with the right of way donated, and the estimated cost for the proposed levee was \$134,035 and \$1,000 for drainage pipes at Green Bay. A great part of the land was tolerably high and quite valuable, being partially protected by old levees, but Lieut. Col. King estimated at that time the construction of a new and permanent levee would be a benefit of about \$15 per acre, or \$234,000. He also stated that the banks of Skunk River would have to be protected against erosion. The value of the land is similar to other portions along the river and runs from \$30 to \$40 in low places to \$100 or more on the high ground.

Blue print file M. R. C./881, sheet 96, shows the banks expected to be overflowed and the proposed location of the levee by the power company, Fort Madison to Burlington. No estimates or grades were made for levee. This overflow line runs from one-half to 2½ miles back from the main bank, with an average width of about 1¼ miles, from 2 miles above Fort Madison, Iowa, to 4 miles below Burlington, Iowa, a distance of approximately 12 miles.

40. *Overflowed land between Dallas, Ill., and Pinkham Slough.*—(415-425 L.) (Prohibitive.)

This section of overflowed land is about 10.5 miles long, has an average width of nearly one-half mile, and contains approximately 3,000 acres, one-third of which is under cultivation. This estimate is based on a contemplated high-water stage equaling at Burlington, Iowa, that of 1888.

The dam at Keokuk, Iowa, owned by the Mississippi River Power Co., will, it is calculated, raise the slope of a high water at Dallas, Ill., 0.93 foot when the Mississippi River has a discharge of 372,000 second-feet, or the same as the maximum discharge at this point in 1888.

At a point about 2¼ miles below the United States gauge at Burlington the effect of the Keokuk Dam upon the high-water slope is expected to cease.

A report of a survey made by Lieut. Col. W. R. King, to ascertain the cost of a levee to protect the overflow lands on the east bank of the Mississippi River between Dallas

City and Oquawka, Ill., was made in 1896. Using the same section of levee, as was done in the above report, viz, outside slope 3:1, crown 4 feet, and inside slope 2:1, it is found (using Lieut. Col. King's report as a basis of estimate) that it would require about 759,000 cubic yards of earth for the construction of the levee to a height 3 feet above the contemplated slope of river at a stage equal to that of the high water of 1888 at Burlington, Iowa.

Estimate of cost of construction of levee.

759,000 cubic yards earth embankment, at 14 cents.....	\$106,260
5 flood gates through levee, at \$800.....	4,000
	110,260
10 per cent engineering and contingencies.....	11,026
Total estimated cost of project.....	121,286

It will be seen that the cost of building this levee is prohibitive, since it would mean an assessment of \$40 per acre for the land protected.

41. *Henderson County drainage district No. 2.*—(425–427.5 L.) (Built.) Commissioners: Frank M. Mellinger, Burlington, Iowa; John Y. Whiteman, Biggsville, Ill., secretary; Geo. F. Gilbreath, Gladstone, Ill.

This district lies entirely in Henderson County, Ill., opposite and a little below Burlington, Iowa, and has the following limits:

Beginning at a point on the Carthage branch of the Chicago, Burlington & Quincy Railroad, about 3 miles below Burlington, Iowa; thence following said railroad in a northwesterly direction to the Burlington bridge; thence along the main line of the Chicago, Burlington & Quincy Railroad about 7 miles in a northeasterly direction to the southwest corner of section 17, township 10 north, range 5 west; thence following a sand ridge in a southwesterly direction about 8 miles to the point of beginning.

The levee along the Carthage branch of the Chicago, Burlington & Quincy Railroad consists of using the company's embankment, widening it on the outside so as to have a 6-foot crown about 1.5 feet above the present base of rail, and outside slope of 2.5:1, the inside slope of the railroad remaining as heretofore, viz, 1.5:1. This levee is built 4 feet higher than the highest stage of river, which occurred in 1892, and is 48 feet thick at a point corresponding to that high-water stage.

Ellison Creek, which emerges from the sand ridge 3 miles above the lower end of the district, is diverted into a channel running at the foot of the ridge, and is to be leveed on both sides. These levees are now under construction and have the following section: Land side slope 2:1, crown 6 feet, slope on creek side 3:1. The channel is to have a width of 40 feet on the bottom.

There are 7,380 acres of protected land in the district, valued at \$60 per acre, 30 per cent of which is under cultivation, the balance being prairie bottom land.

The total cost of this project is estimated at \$169,420, and will be assessed against the property benefited at the rate of \$23 per acre.

Blue-print maps and profiles M. R. C./381, sheets 162–172.

42. *Henderson County drainage district No. 1.*—(427.5–436 L.) (Under construction.) Commissioners: B. L. Ditto, Gladstone, Ill.; J. Y. Whiteman, Biggsville, Ill., secretary; Samuel Stevenson, Gladstone, Ill.

This district is in Henderson County, Ill., and lies between Nos. 2 and 3 of the same name, and is under construction. The limits are as follows:

Beginning at the Chicago, Burlington & Quincy Railroad, near the east end of the Burlington bridge across the Mississippi River; thence along a levee up the bank of the river about 8 miles to a point just below the old mouth of Henderson River; thence in an easterly direction about 2.5 miles along the proposed change of channel of the Henderson River to the Keithsburg branch of the Chicago, Burlington & Quincy Railroad; thence in a southerly direction along said railroad about 1 mile to the main line of the Chicago, Burlington & Quincy Railroad; thence following said railroad about 8 miles in a southerly direction to the river levee, the point of beginning.

The levee along the river has the following section: Slope on river side 3:1, crown 3 feet, slope on land side 2:1. The levee is being built so as to be 4 feet higher than the 1903 high water. In the lower end of the district the Crystal Lake Club has a game preserve of 1,320 acres and this is leveed against drainage. At the upper end of the district it is proposed to straighten the channel of Henderson River and levee both sides.

All the drainage from this district is carried down to Henderson County drainage district No. 2 and pumped out by a joint pumping plant, which is to cost \$56,547. The estimated total cost of levees and drainage ditches is \$214,734 and the assessment in the

area of 7,680 acres is \$27.96 per acre. Thirty per cent of the area is in cultivation, the balance being prairie bottom land that will be cultivated as soon as the drainage system has been completed. The average value of the land in the district is \$60 per acre, but this will greatly increase when under levee protection.

A map and profile are on file in the secretary's office, M. R. C. (M. R. C./881, sheets 152-162, inclusive).

43. *Henderson County drainage district No. 3.*—(436-440 L.) (Proposed.) Commissioners: Martin Walters, Oquawka, Ill.; Roy B. Parsons, Oquawka, Ill.; John Oberly, Oquawka, Ill.; M. E. Bannon, engineer, Fort Madison, Iowa.

This district is in Henderson County, immediately below Oquawka, Ill. There have been no contracts let for the construction of the levee or ditches in this district. It is proposed to construct a levee from the track of the Chicago, Burlington & Quincy Railroad, at the south corporation limits of the town of Oquawka, Ill., down the river behind Island Lake to the proposed channel of the Henderson River; thence up said proposed channel; thence along the western bank of the Henderson River to a point on the north line of section 3, township 10 north, range 5 west, where it is to end. The drainage district limits extend from the end of this levee north to a point on the south corporation limits of the town of Oquawka, Ill., thence about one-half mile west to the upper end of the levee.

The area of the district is 2,780 acres, 50 per cent of which is under cultivation, the balance in timber. The value of the timber land is \$40 and that of the cultivated \$75 per acre. There are about 4 miles of proposed ditches to be excavated, exclusive of 1.5 miles of canal for proposed change of channel of the Henderson River. There is about 4 miles of levee proposed to be built along the Mississippi River and about 1.5 miles along the proposed channel of the Henderson River. The section of this levee is: Outside slope 3:1, crown 6 feet, and inside slope 1.5:1. The total length of this levee is 5.4 miles. This has an average height of 11 feet, and will contain approximately 376,900 cubic yards of earth embankment; which, at 14 cents per cubic yard, will amount to \$52,766. The elevations of the top of the levee are referred to Memphis datum and are as follows:

Station 0=upper end of levee, elevation 544 feet; station 110=where levee turns up canal, elevation 542.6 feet; station 285+85=lower end of levee at Chicago, Burlington & Quincy Railroad, elevation 543 feet.

The levee along Henderson River is to be about 1 mile long, to have an outside slope of 2:1, crown of 4 feet, inside slope of 1.5:1, an average height of 4.5 feet, and will contain approximately 13,600 cubic yards of earth embankment, which at 14 cents per cubic yard=\$1,904.

A tracing showing the limits of the district is on file in the office of the secretary Mississippi River Commission, M. R. C./881, sheet 86.

44. *Flint Creek-Iowa River levee district No. 16.*—(430-460 R.) (Built.) Supervisors, Louisa County: R. S. Johnson, Columbus Junction, Iowa.; O. C. Farmer, etts, Iowa; S. F. Wilson, Wapello, Iowa. Supervisors, Des Moines County: J. H. ettibone, Burlington, Iowa; R. D. Siefken, Mediapolis, Iowa.; Al. Schwaller, address unknown.

This district is located in Louisa and Des Moines Counties, Iowa, and extends from near Burlington, Iowa, to the mouth of the Iowa River, and along the lower side of the Iowa River to the bluffs.

While levees have been built and were in use in this locality since 1897, the present district was organized October 21, 1911. The original levee was built by the United States, ostensibly for river improvement, in 1895-1900, at a cost of \$300,000, but the construction work has just been finished (October, 1913).

From a detailed report on this district in Chief of Engineers Report 1902, pages 37-1642, the following information was obtained:

A right of way 168 feet wide was deeded to the United States for the 35½ miles of levee in the district, with the exception of 2,720 feet, bought for \$400, and 4 miles near Flint Creek, bought by supervisors. The total cost of the right of way to the United States being \$444.75.

Between March 2, 1895, and March 3, 1899, \$300,000 was appropriated, the work being commenced October 4, 1895, and completed July, 1900. The Iowa River portion was constructed in 1895-1897, with a 4-foot crown, 2:1 back slope and 3:1 river slope; length, 42,200 feet; grade, 3 feet above 1888 high water; and a yardage of 178,566, at a cost of 8 to 12 cents per cubic yard. The Mississippi River portion of levee was built in 1897 to 1900, with a 4-foot crown, and later a 6-foot crown, cross section 3:1, river slope, and later 2.5:1 back slope; borrow pits on river side; length of levee, 144,600 feet; yardage, 1,677,785; built 3 feet above 1888 high water; elevation given in Chief of Engineers Report 1902 on map; price per cubic yard varying from 8 to 22 cents. Back ditches were built usually 4 by 4 feet and totaled 115,900 linear feet on Mississippi River portion and 9,000 feet on Iowa River portion of levee.

The drainage system as provided by the United States will be reconstructed by Harman Engineering Co., and in this report will be considered separately from the levee district, and known as the Des Moines drainage district No. 1 and the Louisa-Des Moines drainage district No. 4. The cost of the work from the beginning to June 30, 1902, is given as follows:

Surveys for final location, etc.....	\$5,794.72
Right of way.....	444.75
Drainage.....	10,618.23
Superintendence and inspection.....	29,555.05
Repairs and maintenance.....	1,476.40
Revetment of levee bank (14,770 linear feet).....	5,457.64
Shore protection (6,876 linear feet).....	9,645.97
Earthwork (1,856,351 cubic yards).....	233,963.97
Total.....	296,956.73

Average cost per yard, including superintendence and inspection, \$0.142.

Proposed enlargement of levees given in Chief of Engineers 1900 report, page 2724.

The area benefited by levee is given as 44,722 acres, at an original cost of about \$6.67 per acre. The Harman Engineering Co., of Peoria, Ill., made an extensive resurvey of the district for the purpose of bettering the levee protection and establishing drainage systems within the district, maps, profiles, and report of which are on file in auditor's office, Burlington, Iowa. The levee district was divided into two drainage districts, the lower one, known as the Des Moines drainage district No. 1, extending from the lower end of the levee district (430 R) to near the head of Huron Island (450 R), and the upper one, known as the Louisa-Des Moines drainage district No. 4, extending from the upper end of the lower drainage district to the lower side of Iowa River (460 R).

A map of the levee district showing location of present levees, and profiles giving surface elevations, present and proposed grades, present cross sections about every 600 feet, and places protected by riprap, are on file, M. R. C./881, sheets 173-177.

The proposed grade appears to be only to bring the present levee to a more uniform grade and is in some places above and at others below the present levee, varying from 0.2 to 1 foot in either direction. The levee along the lower side of the Iowa River as shown by cross sections and profile, is 30,750 feet in length from its junction with the Iowa Central Railroad to the junction of the Iowa and Mississippi Rivers, having an average height of about 6.5 feet, grade at Iowa Central Railroad being 572.7 feet M. D. and at Mississippi River, 550.3 feet M. D., the crown to average 4.5 feet, with slope on river side 3:1 and on land side 2:1.

The levee along the Mississippi River is shown with an average height of 10 feet crown 6 to 7 feet, inside slope 2.5:1 and outside slope 3:1, and having a length of 139,950 feet, the grade at the junction of the Iowa and Mississippi Rivers being 550 feet M. D. at the intersection of the levee and the Iowa Central, the grade is 548 feet M. D., and of the railroad, 549.2 feet M. D. At a point opposite the town of Oquawka Ill. (441 L.), it is 543 feet M. D., and at the lowest extremity of the district it is 539 feet M. D. The project calls for 4,800 feet of revetment along the Iowa River and 18,800 feet along the Mississippi River at places designated on profiles.

From an extract in the "Engineering and contracting," written by Chas. W. Durham, assistant engineer, Rock Island office, January 3, 1912, file 1797, 43 and 44, he states that since the levees were turned over by the Government the various drainage districts have lowered the inside grade and put most of the Government's gravity drainage pipes out of commission and pumping plants have been installed. Land formerly valued at from \$5 to \$25 per acre has increased in market value to from \$8 to \$180 per acre, and some has been sold for \$225 per acre. The levee was built by teams and scrapers. The highest flood ever known at New Boston, Ill., which is near upper end of this district, occurred during 1903, but at no point was the levee broken although 23 weak places were found and strengthened. The district is in a high state of cultivation and land at present valuable.

45. *Des Moines drainage district No. 1.*—(430-450 R.) (Proposed.) Supervisor J. H. Pettibone, Burlington, Iowa; R. D. Siefkin, Mediapolis, Iowa; Al. Schwalbe, address unknown. Attorneys: Seerly & Clark and Blake & Wilson. Auditor: F. V. Parrott, Burlington, Iowa. Advisory committee: James Moir, Burlington, Iowa; J. N. Dutton, Burlington, Iowa; Paul Gerber, Oakville, Iowa.

This is the lower one of the two drainage districts within the Flint Creek-Iowa River levee district No. 16. The levee district protects this area from floods, and it was originally drained by a gravity system with outlet pipes built by the United States at an approximate cost of \$6.67 per acre, including levee work. The lower limit is near Burlington, Iowa (430 R), and the upper limit begins near the head of Huron

Island (450 R) and runs back almost due west to the bluffs, inclosing all the area between the Mississippi River and the bluffs.

For earlier work on this district, see Chief of Engineer's 1902 report, pages 1637-1642. Levees are all built 3 feet above 1888 high water and were considered separately under Flint Creek-Iowa River levee district No. 16.

The Harman Engineering Co., of Peoria, Ill., made an extensive survey April, 1910, and maps showing topography, etc., are on file, M. R. C./881, sheets 134-151. Estimates and proceedings to date can be found in auditor's office, Burlington, Iowa.

In this proposed system the areas that have to be drained are as follows:

	Acres.
Hawkeye Creek.....	13,000
Dolbee Creek.....	7,000
Branches south of Dolbee.....	4,700
Bottom lands within the district.....	25,300
Total drainage area.....	50,000

The estimated cost, as submitted by the Harman Engineering Co. September 25, 1909, is:

Pumping plant, 1,200 horsepower.....	\$72,000
Sluiceways and gates.....	12,000
Lazewell drain, 97,500 cubic yards, at 8 cents.....	7,800
Ray Lake-Hawkeye drain, 544,400 cubic yards, at 8 cents.....	43,552
Cottonwood-Dolbee drain, 544,800 cubic yards, at 8 cents.....	43,584
Incidentals, etc., 10 per cent.....	17,894
Total estimated cost.....	196,830

The district was extended at estimated cost, May 5, 1910, of \$44,444; additional drains, May 26, 1910, estimated cost, \$36,953; additional drains, October 31, 1910, estimated cost, \$3,300.

The estimated cost of all work to May 2, 1911, was given as \$342,000, of which \$4,942 was damages; \$3,992, previous surveys; \$8,314, topographical survey; \$4,000, engineering expenses and incidentals; and \$320,752 for buildings, ditches, drains, excavations, etc.

One pumping plant is to be located at Lazewell drain outlet, and is to consist of two 72-inch centrifugal pumps, to discharge 525 cubic feet per second against a 12-foot head, with an efficiency of 75 per cent. Specifications are on file at Burlington, Iowa, and the contract for plant has been let for \$61,500. A smaller plant will be at Tampa Slough and same outlet pipes will be used.

The assessment for lands in the drainage district was \$333,752, and for Burlington, Jackson, Benton, and Huron Townships \$8,248, making a total of \$342,000. The land is in a high state of cultivation and valued at \$100 to \$150 per acre or more. Assistant Engineer Chas. W. Durham states, January 3, 1912, that about 45,000 acres were reclaimed, including the Louisa-Des Moines drainage district No. 4, at a cost of \$6.67 per acre, including levee work, but since the land has been turned over by the Government to the new drainage districts the inside grade has been lowered sufficiently to drain ponds and sloughs and is properly ditched to pumping plants. This lowering of the inside grade has put most of the Government gravity drainage pipes out of commission, and the cost of the reclamation will be increased to about \$13 per acre, including cost of levee protection.

Land formerly valued at \$5 to \$25 per acre has increased in market value to from \$30 to \$180 per acre, and some land has been sold as high as \$225 per acre. The acreage of usable land has been increased about 25 per cent by lowering the grade.

The large drainage ditches are Ray Lake-Hawkeye, 60-foot base; Cottonwood-Dolbee, 40 and 60 foot base, into which smaller drains connect having a 10-foot base. The Lazewell drain, 80-foot base; takes care of the most drainage, and the pumping plant is located on it. The Yellow Springs drain has a 60-foot base with levees on either side having a 3 foot crown, 2:1 inside and 3:1 outside slopes.

Ditches were usually built with a 1:1 slope. Besides ditches many smaller tile drains are in operation.

46. *Louisa-Des Moines drainage district No. 4.*—(450-460 R.) (Proposed.) Supervisors: O. C. Farmer, Letts, Iowa; S. F. Wilson, Wapello, Iowa; R. S. Johnson, Columbus Junction, Iowa; H. W. Baker, Wapello, Iowa, auditor.

This is the upper one of the two drainage districts within the Flint Creek-Iowa River levee district No. 16. The levee district protects this area from floods and originally built by the United States Government was drained by a gravity system

with outlet pipes, which, with the levee work, amounted to about \$6.67 per acre. For this early work see report Chief of Engineers, 1902, pages 1637-1642.

The general location is in Louisa and Des Moines Counties, Iowa, having as a lower limit the Des Moines drainage district No. 1 (450 R.) and an upper limit along the lower side of Iowa River (460 R.), embracing all the lands between the Mississippi River and the bluffs.

Levees surrounding the district were built 1897-1899, with a grade line 3 feet above 1888 high water and were considered separately under the Flint Creek-Iowa River levee district No. 16. The Harman Engineering Co. of Peoria, Ill., have made a survey of this district giving contours for every foot in elevation and a general map is on file covering this district, M. R. C./881, sheet 173.

The land is in a high state of cultivation, tilled, etc., and valuable for agricultural purposes. Mr. Baker, of Wapello, Iowa, estimated the land values at \$100 to \$150 per acre, with some probably above \$150. The land values given by Assistant Engineer Chas. W. Durham, January 3, 1912, shows land formerly valued at \$25 per acre increased to \$80 or more per acre, some being sold at \$180 to \$225 per acre. There are approximately 16,000 acres in this district, as taken from plat filed M. R. C./881, sheet 173.

Estimates of cost could not be obtained, as the district was enjoined against proceeding with drainage work, but the decision in court was reversed during first part of October, 1913, and work will progress soon.

Harman Engineering Co. have been written for information, but no reply has been received to date, October 25, 1913.

47. *Oquawka, Ill., to Keithsburg, Ill.*—(440-452 L.) (Prohibitive.)

The main bank of the Mississippi River between Oquawka and Keithsburg is from 15 to 18 feet above the high-water stage of 1888.

There is a strip of low land from mile 444.5 to 449.5, formed by alluvial deposit, and all in timber, comprising about 1,720 acres of land that is from 10 to 15 feet below the high-water stage of 1888. This strip of land is about one-half mile in width and is an island, behind which flows Campbell and Benton sloughs. In order to protect this land from overflow, Campbells Slough, at the head of the island, and Benton Slough, at the foot, would have to be leveed across, and this, together with a levee along the river side of the island, would cost approximately as below:

413,000 cubic yards of earth embankment, at 15 cents.....	\$61, 950
Floodgate at foot of island.....	850
Total.....	62, 800

This would cause an assessment of \$36.51 per acre and would be prohibitive.

48. *Keithsburg drainage district.*—(453.5-456.5 L.) (Built.) Commissioners: R. H. Roberts, New Boston, Ill.; M. F. Prouty, New Boston, Ill.; F. B. Wicketts, New Boston, Ill.

This district is in Mercer County, Ill., and immediately above Keithsburg, Ill. The limits of this district are as follows:

Beginning at the Iowa Central Railroad where it crosses the Mississippi River at Keithsburg, Ill., thence along the levee, following the east bank of the Mississippi River about 3 miles in a northwesterly direction to a point about one-fourth mile below the mouth of Edwards River, thence continuing along the levee about one-half mile in an easterly direction to its end, thence following the high east bank of a slough about 2½ miles in a southeasterly direction to the Keithsburg branch of the Chicago Burlington & Quincy Railroad, thence following along said railroad about 1 mile in a southerly direction to its crossing of the Iowa Central Railroad, thence along the last mentioned railroad about one-fourth mile in a westerly direction to the levee, the point of beginning.

The levee in this district is built to a height corresponding to 2.8 feet above the high water of 1892, or 1.5 feet above the highest stage of river at Keithsburg, which occurred in 1851. It is 3.6 miles long, has an average height of 9.5 feet, and contains approximately 196,602 cubic yards, at 12.5 cents per yard, and cost \$24,575.25.

The cross section of the levee is as follows: Outside slope, 3:1; crown, 6 feet; inside slope, 2:1. There are 2.9 miles of main ditch, having a bottom width of 10 feet and side slopes of 1:1 and 3.1 miles of auxiliary ditches, having a bottom width of 8 feet side slopes, 1:1.

There were 56,617 cubic yards of material excavated from the ditches, at 10 cents per yard, or at a cost of \$5,661.70.

All of the drainage is carried through the main and two auxiliary ditches which run lengthwise through the district and is pumped over the levee above the Iowa Central Railroad. The pumping plant contract price was \$6,735.42.

There are 1,294 acres of land protected or benefited in this district.

49. *Muscatine-Louisa drainage district No. 13.*—(460.5–480.5 R.) (Proposed.)

The present district, petitioned about March, 1910, has just been authorized by the supreme court to begin work as a district, with J. W. Gardner, commissioner from Louisa County and J. C. Park, commissioner from Muscatine County.

Supervisors in Louisa County: O. C. Farmer, Letts, Iowa; S. F. Wilson, Wapello, Iowa; R. S. Johnson, Columbus Junction, Iowa; H. W. Baker, auditor, Wapello, Iowa. Supervisors in Muscatine County: M. J. Schallaberger, Muscatine, Iowa; A. D. Noble, Muscatine, Iowa; George J. Lang, Muscatine, Iowa; J. N. Flater, Muscatine, Iowa; H. B. Phillips, Muscatine, Iowa; A. S. Lawrence, secretary, Muscatine, Iowa. Attorneys appointed October, 1911: J. J. Seerly and H. O. Weaver.

This district is composed of the old Muscatine Island levee (plat filed M. R. C./881, sheet 101), the old drainage district No. 3, Muscatine Slough (plat returned to H. W. Baker, Wapello, Iowa), all of the land between Port Louisa and lower city limits of Muscatine, Iowa, not included in above two districts, Louisa levee district No. 15 (proposed) and extension of Louisa levee district No. 15 (blue print returned to H. W. Baker).

The upper limit of the drainage district is along the lower limits of the city of Muscatine (480.5 R) and the lower limit is near the upper side of the Iowa River (460.5 R) and the district embraces practically all the land between the Mississippi River and the high ground at bluffs.

An extract from an article on "Reclamation and conservation of the upper alluvial lands in the upper Mississippi Valley," by Charles W. Durham, assistant engineer, United States Rock Island office, states that the Muscatine levee was commenced as early as 1858, is about 13 miles long and incloses 22,000 acres of land. When first built it was drained by three sets of outflow valves and pipes in connection with Muscatine Slough, but recently pumping plants have been added. The reclaimed land has more than trebled in value and affords an excellent example of the transformation of a tract of low-lying swampy ground into one of the garden spots of the world. The soil is sandy and rich black material and very productive when properly drained. During September and October, 1896, a survey was made covering the levee surrounding this district under the direction of Lieut. Col. W. R. King. A profile of the old levee and surface elevations, with proposed levees to be built, is given and estimates of yardage and costs are shown. The levee was to have been built to a grade 3 feet above 1892 high water, the present levee at that time being built to this high water or to 1 foot above.

The upper part of the levee showed at that time an average height of about 5 feet above the sand mound to Port Louisa about 6.5 to 7 feet. Below Port Louisa there are no levees, but Louisa Levee, district No. 15, is now proposed to take in this area, and will be considered separately. This was formed separately from the drainage district for purposes of assessment, as the landowners above Port Louisa had a levee and would not bear the expense of building one below their lands.

Lieut. Col. King proposed building a levee back of the lower part of the town of Muscatine, then along the old levee down the bank of the Mississippi River to its end, Port Louisa, and from there to the Iowa River, with grades 3 feet above 1892 high water, or 571.73 feet C. D.; back of Muscatine, Iowa, 567.7 feet C. D.; near the sand mound 566.38 feet C. D.; near Port Louisa, 564.41 feet C. D., near mouth of Iowa River; and 564.48 feet C. D. at the bluffs on upper side of Iowa River.

The estimates of costs were as follows:

The proposed levee back of Muscatine had a length of approximately 21,100 feet and a yardage of about 166,854 cubic yards; the old levee in existence had a length of about 56,150 feet and would require 210,545 cubic yards for enlargement and bringing to grade, and the proposed levee from Port Louisa to the end had an approximate length of 52,400 feet, a yardage of 538,607 cubic yards and an average height of about 4 feet, with a 4-foot crown. 3:1 slope on river side and 2:1 slope on land side.

The entire yardage was estimated at 916,006, at 15 cents per yard, being \$137,400, with drainpipes, etc., at \$2,400, making a total cost of \$139,800. The length of the levee was given as 24.5 miles. The land at the time of this project was probably worth \$15 per acre, on an average, and the raising and strengthening of this levee so as to give full and permanent protection against floods would probably increase its value to \$15 per acre, or \$330,000. The old levee had the lower end open from Port Louisa to the bluffs and during high stages that part of the district was subject to overflow, but recently a levee was built, known as the Hoffman Levee, and under present conditions the levees hold out the water fairly well, but the protection for drainage is not so good.

During 1910, F. A. Macdonald, civil engineer, made a survey of the district and found the land, with few exceptions, to be below 1892 high water. From profiles, plats, and estimates on file in Burlington, Iowa, the following data was obtained:

The levee under present conditions affords protection except during high stages, but is low and weak in places. Seepage and rainfall collected as high as 544 feet M. D. He planned to repair old levee and raise it 2 feet above 1892 high water, and construct a new levee from the south end of the present levee along the Mississippi about 7.5 miles to the bluffs north of Toolstoro. He intended to lower the drainpipes through Hoffman Levee and drain Keokuk Lake, and install a pumping plant at the lower end of the district with a capacity of approximately 202,500 gallons per minute, to take care of the entire drainage and drain Odessa Lake.

The area of watershed for the drainage district in Muscatine County is given as 29,440 acres, and in Louisa County as 24,040 acres, making a total of 53,480 acres. The area below 1892 high water in Muscatine County is given as 15,774 acres, and in Louisa County as 14,208 acres. The area affected by backwater in Muscatine Slough above the Hoffman Levee, is given as 5,539 acres in Muscatine County and 10,352 acres in Louisa County, or all lands below 547 feet M. D.

The area below the Hoffman Levee subject to overflow is approximately 5,234 acres. The estimates of cost were:

For Muscatine Slough channel, 20 to 24 feet base and 1:1 slopes, 256,000 cubic yards, at 10 cents.....	\$25, 600
Damages.....	210
Ditches, with 4 to 6 feet base, about 98,502 cubic yards, at 15 cents and damages.....	21, 560
New levee south of Port Louisa, length 7.44 miles, 6-foot top, 2:1 river slope and 1.5:1 land slope, 2 feet above 1892 high water, 239,096 cubic yards, at 15 cents, \$35,864, and the total amount, including 89 acres right of way, etc.....	45, 440
Repairs to old levee between Muscatine and Port Louisa, 52,248 cubic yards, at 20 cents.....	10, 450
Pumping plant, capacity 202,500 gallons per minute.....	80, 000
Engineering expenses.....	8, 500
Contingencies.....	9, 330
Total estimated cost of improvement.....	201, 100
Cost of present levee in Muscatine County.....	29, 580
Cost of present levee in Louisa County.....	12, 400
Cost of improving drainage district No. 3.....	23, 900
Total estimated cost to the district.....	272, 100

Average cost per acre to lands to be benefited, \$9.11. The drainage system at the upper end of main ditch was to have a grade of 540 feet M. D.; at station, 96,200 feet or Hoffman Levee, the water was to drain through three 36-inch pipes at an elevation of 533.1 feet M. D.; and at station, 138,000 feet, or at lower end of main ditch, 26.14 miles long, the proposed pumping plant was to drain the water to 530 feet M. D.

The profile of the levee shows the following elevations: At Hoffman Levee, being zero on profile, the grade is 552 feet M. D., with high water of 1892, 549.46 feet M. D. The levee is about 9.5 feet high and 1.5 feet below grade. The levee surface is very irregular and from 1.5 feet below to 2 feet above the proposed grade, averaging about 1 foot below. Near the sand mound stations, 26,000-27,000 feet, the levee is about 3 feet above proposed grade, which is 553.7 feet M. D. At station, 31,000 feet, the grade is 554 feet M. D., high water 1892, 551.58 and top of levee 552.5. At the southern city limits of Muscatine, station, 62,600 feet, the grade is 556.2 feet M. D. High water 1892, 554.27 and top of levee 554.8 feet M. D.

The lower part of the drainage district was subdivided into a levee district for assessment purposes, and Harman Engineering Co., employed as engineers, submitted plans and estimates, which were adopted October 25, 1911.

The limits were changed to exclude lots in the city limits of Muscatine, and Macdonald's estimates for the drainage system were modified as follows:

Ditches and laterals, 398,300 cubic yards, at 10 cents.....	\$39, 830
Pumping plant, 1,100 horsepower, at \$100.....	110, 000
Sluiceways; incidentals, etc.....	22, 270
Total cost for 15,900 acres.....	172, 100

or \$10.90 per acre. The proposed extension to the lower end of the district of 850 acres would make the total land in the district 16,750 acres, with a total estimated cost of \$173,468, or \$10.36 per acre. Assessors found damages from the plans of the present project amounted to only \$260. The levee district below Port Louisa was considered separately.

Mr. X. Grosjean, levee commissioner at Muscatine, Iowa, stated that the value of the land before the levee was built was from \$15 to \$20 per acre, but after the levee was constructed the value increased to \$65 to \$150 per acre. The old first levee cost about \$2 per acre for lands benefited. Protection work has been placed by the Rock Island office about 3 miles below the sand mound, but in some places the river has undermined the levee and immediate repairs have been recommended.

Seepage during 1912 high water caused trouble and after the water had fallen these places were cut out and in every instance rotten stumps were found. The Hoffman levee is a private work about 7-8 feet high, 2:1 slopes, and with grade about 550.5 feet M. D.

The levee from the sand mound to Muscatine, Iowa, has about a 7-foot crown and is used as a wagon road during high water. Below the sand mound, the crown comes more to a point, being about 3 feet, and can not be used as a road.

50. *Louisa County, levee district No. 15 and extension.*—(460.5-467 R.) (Proposed.) Supervisors: S. F. Wilson, Wapello, Iowa; R. S. Johnson, Columbus Junction, Iowa; C. Farmer, Letts, Iowa.

The district is in Louisa County, Iowa, in the lower end of the Muscatine-Louisa drainage district No. 13 and extends from just above the Iowa River (460.5 R.) to Port Louisa (467 R.) and embraces all the land between the Mississippi River and the bluffs, the upper limit extending almost due west from Port Louisa and the lower limit joining the bluff just above Toolsboro, Iowa. The original district extended upward from 461.5 R. but was extended to the present limits. The district was established to build levees and while it is proposed at this time, it is expected that work will be begun next spring. For early estimates and reports covering this area see Muscatine-Louisa drainage district No. 13.

Harman Engineering Co. have modified a project of F. A. Macdonald and submitted the following estimates of cost for Louisa County levee district No. 15:

acres right of way (7 miles).....	\$10, 530
3,300 feet of levee embankment, 386,800 cubic yards, at 12.5 cents.....	48, 350
Incidentals.....	3, 500
Total cost.....	62, 380

The approximate assessable acreage is 4,600 acres, exclusive of lakes and sloughs, which would make an average cost of \$13.55 per acre. Later 850 acres were proposed to be annexed to this district at its lower end and called "Extension of Louisa County levee district No. 15," with the following estimates:

Levee extension, 169,460 cubic yards; omitted by change, 87,800 cubic yards; total, 81,660 cubic yards, at 12.5 cents, \$10,207.50; 10 per cent incidentals, etc., \$1,020.75; total additional cost, \$11,228.25; or average cost per acre for lands annexed, \$3.21 per acre.

The levee on the extension has an average height of about 8.5 feet, running from 7 to 10 feet, the cross section to have a 6-foot crown, 3:1 river slope and 2:1 land slope. The levee on the original project has the same cross section, but an average height of about 8 feet and proposed grade 3 feet above 1892 high water, and to correspond with the heights of levees on the east bank of the river.

A profile of the district by F. A. Macdonald, on file at Muscatine, Iowa, shows the original levee to be 41,300 feet long with surface elevations 546 to 541 feet M. D.; high water of 1892, at Port Louisa, 549.46 feet M. D.; and at the lower end 549.14 feet M. D. Assistant Engineer, Chas. W. Durham, describes this area as 5,000 acres of fine low-lying land, which could be reclaimed to advantage.

Lieut. Col. King stated that the levees proposed in his report (1896) would benefit about 6,000 acres of land and the appreciation in this case would be from \$2 to \$25 per acre, or \$138,000. Land values are given as about \$15 per acre, and as the land is still subject to overflow, the valuation has probably not changed much, although even leveed will undoubtedly rise to \$65 per acre or more, as in the upper part of the drainage district.

F. A. Macdonald notes there are 5,234 acres of land subject to overflow below the Hoffman Levee, which is near Port Louisa.

A pumping plant of 1,100 horsepower to take care of all the drainage in the Muscatine-Louisa drainage district No. 13, is to be located at the lower end of this district, at an approximate cost of \$110,000, and to drain water to an elevation of 530 M. D. For data as to drainage in the district, see Louisa-Des Moines drainage district No. 13.

51. *Bay Island drainage and levee district No. 1.*—(459–473.5 L.) (Built.) Commissioners: R. H. Roberts, chairman, New Boston, Ill.; D. S. Prentiss, secretary, New Boston, Ill.; M. F. Prouty, New Boston, Ill.; J. A. Harman, engineer, Peoria, Ill.; W. J. Graham, attorney, Aledo, Ill.

Lies entirely within Mercer County, Ill., and is immediately above New Boston, Ill.; comprises an area protected from overflow of 19,300 acres (not including 1,600 acres in lakes), of which about two-thirds is under cultivation and one-third in timber, and all valued at approximately \$100 per acre. The levee forming the lower limit begins at a point $1\frac{1}{2}$ miles north of New Boston, Ill., and runs southwesterly across Dog Lake and Sturgeon Bay to the Mississippi River; thence it follows closely the bank of said river to a point about 1 mile below the Mercer-Rock Island county line and forms the western limit of the district. The upper limit is an east-and-west line, about 1 mile below the Mercer-Rock Island county line, and the highland along the bluff forms the eastern limit.

The main ditch runs through a string of lakes, through about the middle of the district. Eliza Creek is leveed on both sides for $1\frac{1}{2}$ miles after leaving the bluff and drains into the main ditch about 4 miles above the pumping plant located at the lower end of the district on Sturgeon Bay. The pumping plant contracts aggregate \$85,596.06.

The levee has an outside slope of 3:1, inside slope 2.5:1, and crown of 6 feet. It is 14.3 miles long and is built 4 feet higher than the high water of 1888.

The levees and roadways of this district contain 732,233 cubic yards, which, at 10½ cents per cubic yard, cost \$76,884.46.

The cost of drainage ditches and what work went with it was as follows:

2,776 cubic yards, at 15 cents.....	\$416.40
1,492 cubic yards, at 16 cents.....	238.72
169,743 cubic yards, at 10 cents.....	16,974.30
132,355 cubic yards, at 9.75 cents.....	12,904.69
Total.....	30,534.11

52. *Drainage Union district No. 1.*—(473.5–479 L.) (Built.) Commissioners: W. C. Maucker, Rock Island, Ill.; William F. Colberg, Muscatine, Iowa; Ed. Kranz, Muscatine, Iowa; Wallace Treichler, Rock Island, Ill., engineer.

The district lies in Rock Island and Mercer Counties, Ill., the upper limit being (479 L) and the lower limit being (473.5 L), or just below the foot of Blanchard Island. The land included in the district lies between the Mississippi River and the high ground near the bluffs.

As the mouth of Copperas Creek had filled up, and the backwater during heavy rain flooded the adjacent land, this district was formed. It was organized to take care of the drainage of Copperas Creek only, but after the benefits were seen, levee sub-district No. 1 of drainage Union district No. 1, was organized to build levees and drainage ditches from Copperas Creek to the lower end of drainage Union district No. 1. That part of the district above Copperas Creek was later taken up by the Drury drainage district.

A blue print of the district made December, 1905, shows improvements to date (map returned to Wallace Treichler). The district was formed during 1905 and all work has been completed, the only construction work being the canal straightening of Copperas Creek and levees on either side. Topographic survey of the district was not made, but Mississippi River Commission charts and Lieut. Col. King's report and estimates were used to advantage. Lieut. Col. King's report, January, 1897, gives profiles, grades, and estimates for levees along Copperas Creek and the Mississippi River in this district. The cost of the work and cross section of the canal were given by Mr. Treichler as follows: Ditch has a base of 40 feet, with a depth of 7 to 14 feet; the top of the ditch is about 60 feet wide; 10-foot berms were allowed on either side of the canal to the toe of the levee; the levees have a crown of 6 feet, 2.5:1 slope and an average height of 8 feet, built to a grade at the Mississippi River of 22 feet above a gage near Muscatine, Iowa, or at an elevation of 560.3 feet old Memphis datum. There is a fall of 17 feet in the grade of the canal from the bluffs to the Mississippi River, a distance of 2 miles, the larger part of which is between the bluffs and a point halfway to the river. The levee is built above flood line of Copperas Creek and 3 feet above high water of 1892 on the Mississippi River.

The total cost to the district was \$23,000, and price per yard, including clearing and timber, 14 cents. Land was formerly worth from \$10 to \$15 per acre, but due to this project and the levee districts is now valued at from \$100 to \$150 per acre. The land was partly cultivated before draining and leveeing, but is practically all under cultivation now. The levees along Copperas Creek have held all high water

since their construction, but during 1911 an ice gorge formed near the mouth of the creek and water backed up and ran over the tops of the levees until the gorge loosened and went out. Mr. Lillybridg, of Muscatine, stated the corn crop averaged 100 bushels per acre and most of the ground was too rich to raise wheat, as it fell over before being cut.

For further data covering this district see Drury drainage district and levee sub-district No. 1 of drainage Union district No. 1.

53. *Levee subdistrict No. 1 of drainage Union district No. 1.*—(473.5–476.5 L.) (Built.) Commissioners: W. C. Maucker, Rock Island, Ill.; Walter Ziegenhorn, Muscatine, Iowa.

This district was formed after the benefits were found from building the Copperas Creek Canal, and is located in the lower part of drainage Union district No. 1, from Copperas Creek (476.5 L.) to the lower end of the district (473.5 L.). The land included in this district lies between the Mississippi River and the high ground near the bluffs.

Wallace Treichler, Rock Island, Ill., was employed as engineer, and furnished the following information and a blue print map, with work to date. (Map returned.) The district was formed and work begun during 1905 and completed about 1910.

The plans and profiles of Lieut. Col. King were followed closely as to the levees. The average slope of the Mississippi is about 0.5 foot per mile. The levee was built with a 6-foot crown, 2.5:1 inside slope and 3:1 outside slope, average height of levee 12 feet, and a length of about $3\frac{1}{4}$ miles. The grade at Copperas Creek is given as 22 feet above low water at Muscatine, or approximately 3 feet above high water at Muscatine, Iowa. The Rock Island office gives 17.4 feet as reading of Muscatine gauge during high water of 1892, but Mr. Treichler built his levee to an elevation corresponding to reading of 22 feet on a gauge on the Illinois side of the Muscatine bridge.

Mr. Charles W. Durham, assistant engineer, Rock Island office, stated that the elevation of the zero of this gauge is 551.40 feet Cairo datum, or low water of 1864. This would make the levee built to 573.40 feet Cairo datum, or 560.27 feet old Memphis datum (the datum to which the Mississippi River Commission charts are referred). The correct elevation, Memphis datum, would be 559.6 feet. The levee was said to be built about level, and although they tried to keep it at least 3 feet above 1892 high water, it was about 3 feet above Bay Island Levee where it connects with that district. The Bay Island Levee grade as given by Harman Engineering Co. as 554.6 feet Memphis datum, and 3 feet above this would indicate the levee was built to about 558 feet Memphis datum. The district is drained by ditches, with approximately 20 feet base, into Glancy Lake, and thence into Bay Island drainage and levee district No. 1. The area within the district is about 4,100 acres and the total cost of improvement \$22,000, all of which was contracted for 14 cents per cubic yard and has been paid. There are no pumps in the district.

The land before being leveed averaged about \$10 per acre in value, although Mr. Treichler bought 72 acres for \$200, and after construction commenced sold it at \$85 per acre. The land was partly cultivated before building of levees, but is now practically all cultivated, and average values are about \$150 per acre. Corn averages about 100 bushels per acre, and wheat seems to grow so large it falls over before it can be cut and is lost.

Lieut. Col. King gives estimates of land values in 1897 as \$2 per acre, average value. Charles W. Durham, assistant engineer, Rock Island office, stated January 3, 1912, "Although but two years in operation, the increase in market value of the land is about 600 per cent."

54. *Drury drainage district.*—(476.5–485 L.) (Built.) Commissioner: Charles Treichler, Muscatine, Iowa, R. R. No. 8.

This district is in Rock Island County, Ill., and opposite Muscatine, Iowa, the lower limit being at Copperas Creek Canal (476.5 L.), and the upper limit being at the center of island No. 333. The land inclosed lies between the Mississippi River and the high ground at the bluffs.

Wallace Treichler, engineer for the district, followed the plans and profiles of Lieut. Col. King's report, and did not make an extended topographical survey. The upper part of drainage Union district No. 1, or that portion above Copperas Creek, is included in this district. For improvement of Copperas Creek and levee constructed at this place see drainage Union district No. 1.

The Drury drainage district was proposed November 29, 1906, and the following data was submitted by the engineer, and is on file at Rock Island, Ill.:

Estimated cost:	
312,360 cubic yards levee construction, at 12 cents.....	\$39, 04
137 acres right of way, at \$30.....	4, 11
137 acres clearing, at \$10.....	1, 31
Pump and engineer's house.....	7, 11
191,260 cubic yards ditch work, at 9 cents.....	17, 21
Court costs, etc.....	2, 11
Attorney's fees.....	1, 81
Engineering expenses, etc.....	1, 71
Commissioners' fees.....	1, 11
Estimated total cost.....	75, 51

Approximate acreage, 5,200 acres.

The levees were to be constructed with a 4-foot crown, river slope 3:1, and land slope 2:1, and have an average height of 8.5 feet, the length along the Mississippi River being 7.5 miles. The ditches, about 13 miles in length, were to be 20 to 30 feet wide, with the majority about 20 feet, and a depth of 7 to 8 feet. A 20-inch centrifugal pump and a 120-horsepower engine was proposed, but, after being built, was found inadequate and a 50-inch pump has been installed at a cost of \$25,000. The Mississippi River Commission Chart No. 147, published in 1892, shows the majority of the land at that time covered with timber and not cultivated, the general elevation being about 545 feet M. D.

Lieut. Col King, in his report, estimated the average value per acre to be \$2. The estimates submitted November 29, 1906, the land was valued on an average of about \$12 per acre, but this value was expected to increase to \$62 per acre, or the land would be benefited to the amount of \$255,000, which is more than three times the cost of making the proposed improvements. No land would be damaged except the land used for levees and ditches, which would amount to about \$4,110. Assessments found annual benefits of \$3,003 on \$14,000 assessed value. The actual assessments amounted to \$83,147, which was proportioned against the property owners, to be paid in 10 annual installments.

As the district could not float bonds immediately, work was not begun until 1907 and at present the district is bonded for \$85,500, of which \$25,000 is for pumping and \$60,000 for levees and ditches. The levee was to be built to a grade at least 1 foot above 1892 high water and about level. The engineer used the 22-foot mark on the gauge on the Illinois side of the Muscatine Bridge as a grade line, which would correspond to 559.6 feet true M. D., as shown in report on levee subdistrict No. 1 of drainage union district No. 1. A map showing the district with improvements up to date was obtained from Mr. Treichler and has been returned. A cross section of the levee built, had a crown of 6 feet and 2:1 slopes, the average cost per yard being 10.7 cents.

The levee was never completely finished by the contractor and about \$1,600 was withheld, as he left places in the levee 1 to 1.5 feet below grade. Mr. Lillybridge, Muscatine, Iowa, stated that these places have been brought up to grade lately by the commissioners, and the levee is in good shape, and withstands highest stages of water, the average cost of the original improvements being \$13.20 per acre.

The expenses of the district to July 24, 1908, were given as \$60,527. Mr. Treichler stated the land was valued at \$6 to \$25 per acre before levees were built, but advanced to \$150 after construction. All of the land is now practically under cultivation. Mr. Lillybridge stated that it was worth from \$75 to \$250 per acre. Corn averages 30 bushels per acre, but wheat could not be properly raised at present, the ground being too rich.

The first estimate showed that \$500 annually was expected to keep the district in repair. This was later raised to \$1,000, then 60 cents per acre, and at present a maintenance tax of \$1 per acre is levied.

The actual expenses for upkeep of the district from September 1, 1912, to September 1, 1913, was \$5,000.

EUGENE L. HARMON

SYNOPSIS OF HEARINGS HELD BY THE MISSISSIPPI RIVER COMMISSION, ON BOARD THE U. S. STEAMER "MISSISSIPPI," NOVEMBER 10 TO 14, 1913, AT VARIOUS POINTS ALONG THE RIVER BETWEEN ROCK ISLAND, ILL., AND CAPE GIRARDEAU, MO.

ROCK ISLAND, ILL., November 10, 1913.

The commission met at 10.30 a. m., on board the U. S. steamer *Mississippi*, at Rock Island, Ill., in conformity to call of the president.

Present: Col. C. McD. Townsend, Corps of Engineers, United States Army, president; Hon. R. S. Taylor; Mr. J. A. Ockerson; Mr. Homer P. Ritter, Assistant, United States Coast and Geodetic Survey; Col. James G. Warren, Corps of Engineers, United States Army; Mr. Charles H. West; Col. Lansing H. Beach, Corps of Engineers, United States Army, members.

Absent, none.

Maj. William B. Ladue, Corps of Engineers, United States Army, acting secretary, was present.

Mr. M. Markham, Corps of Engineers, United States Army, and Capt. C. O. Herrill, Corps of Engineers, United States Army, district officers, were in attendance.

The following-named gentlemen were present for a hearing:

Mr. R. H. Roberts, New Boston, Ill.; Mr. D. S. Prentiss, New Boston, Ill.; and Mr. F. Prouty, New Boston, Ill., all representing the Bay Island drainage and levee district.

Mr. D. S. Prentiss addressed the commission, stating that he represents the Bay Island drainage and levee district No. 1, above New Boston, Ill., comprising about 9,300 acres of land; that the district has built its own levees and established its own drainage and would like to have the Government assume the maintenance of the levees.

He handed in a written statement, prepared by their attorney, briefed below:

26-22. Bay Island drainage and levee district. Statement of organization, expenditures, etc. (No date.)

In reply to questions, he stated that the levees of the district are 4 feet above the highest water recorded by the Government, and average about 6 or 7 feet above the natural bank, with a crown of 6 feet width; that the work was done under authority of State laws, the commissioners having been appointed by the county court, and the tax for building the levees and providing for drainage having been levied on the land in proportion to betterments as estimated by the commissioners—the maintenance of the levees being uniform; that the levees had been built in accordance with Government specifications used on levees on the Iowa side of the river, and that the length of levees in the district is about 14 miles. He also stated that the total cost of levee and drainage work in the district has been \$242,000, of which amount \$80,000 was expended for levees. The annual tax for last year was stated to have been 50 cents per acre, and to 60 cents per acre for the coming year. The original cost of the project averaged about \$12.92 per acre, and the work has increased the value of the lands in the district from about \$25 to from \$35 to \$100 per acre. The principal crops are corn and wheat. He referred to 1 mile of levee that is subject to wave wash, where revetment work was thought to be desirable, and stated that they would like to have the commission undertake this work.

As to the drainage system, he stated that they have two pumps, with an average lift about 5 feet, and a maximum lift of not over 15 feet, and a capacity of 100,000 gallons per minute for each pump, the pumps being run from five or six days per week in the spring to one day every two weeks in summer, as necessities require.

Mr. R. H. Roberts spoke briefly, stating that all that the commissioners desire is that the Government take charge of the levees; that the district will take care of the drainage, and that he did not think any revetment work would be needed for several years.

In reply to questions he stated that the amount expended for care of the 14 miles of levee has been less than \$200 a year for the 14 miles.

As to the height of the levees, Mr. Roberts stated they are 4 feet above the highest water at the lower end of the district, but only 3 feet above at the upper end, the levees at the lower end having been raised 18 inches on account of the construction of the levee on the Iowa side of the river.

Mr. Prentiss spoke briefly of the district just above his district, which has 5 miles of levee which is necessary as a protection to the Bay Island district, the entire area of the two districts being about 24,000 acres. He stated that the commissioners of the upper district are indifferent as to the care and maintenance of the levee and are also opposed to consolidation with the Bay Island district. Government control of the

levees would, he thought, relieve the Bay Island district from fear of overflow from a break in the levees of the district above.

There being no others present who desired to be heard, the meeting adjourned at 10.50 a. m.

NOVEMBER 10, 1913.

(Second meeting.)

The commission met at 2.40 p. m., on board the steamer *Mississippi*, at Muscatine, Iowa (¹ 481), for the purpose of giving a hearing.

The attendance was the same as at the preceding meeting.

The following persons were present for a hearing:

Miss Susan F. Stone, representing the civic association; Dr. H. F. Lang; Mr. James Q. Beatty; Mrs. Beatty; Mr. H. W. Metzger, representing Muscatine Chamber of Commerce; Mr. J. J. Ryan, county engineer, Muscatine County, and others.

Mr. Lang spoke first in the interest of the river front at Muscatine; he requested that the United States build a retaining bulkhead along the harbor line, in order that the city may fill the area behind the established harbor line, thus making land which will be available for park and other purposes.

He presented a paper, briefed below:

1926-23. Civic Association of Muscatine, Iowa. Request for shore protection along river front (Nov. 10, 1913).

Miss Stone spoke in behalf of the civic association, urging the desired work along the river front.

Mrs. Beatty read and filed a paper, briefed below:

1926-24. Beatty, James Q. Submits request to have levee built along the river front from Port Louisa upstream in northern end of Louisa County, so as to afford protection to the land known as "Big Timber" and lying between the river and the present levee, which is built considerable distance back from the river. (No date. Map attached.

Mrs. Beatty stated there are about 4 miles of river front at this locality unprotected leaving about 1,300 acres of land exposed between the river and the present levee.

Mr. J. J. Ryan next addressed the commission. He read and filed resolutions of the board of supervisors of Muscatine County, briefed below:

1926-25. Board of Supervisors, Muscatine County, and Levee Commissioners, Louisa County. Resolutions requesting the Government to make repairs and enlargement to levee beginning at Muscatine Slough, in Muscatine County, and extending to the Muscatine-Louisa County line, thence southward into Louisa County. (No date)

In reply to questions, Mr. Ryan stated they have made no estimates of the cost of the repairs needed; that the levee had originally an average height of 6 or 7 feet above the bank in Muscatine County, increasing to about 12 feet at the lower end of Louisa County, and a grade of 2 feet above the high water of 1892, with a 6-foot crown; but the height and cross section have been considerably reduced in places, and in many places the levees are now below the high water of 1892; that the levee has a length of about 15 miles, 6 miles in Muscatine County and the balance in Louisa County; that the levee is continuous along the entire 15 miles, and cost about \$30,000 to construct; that the original levee was built in 1850, and the present levee, on the same line, was built in 1883; that there have been no breaks in the levee since 1892, but that considerable work is required at high water, to hold it; that the area protected is 18,000 acres in Muscatine County and 6,000 acres in Louisa County; and that the last tax levy, made two years ago, was 5 cents per acre. As to the right of way for the levee, he stated that the right of way had been donated. He stated the new drainage district comprises 22,000 acres, and takes in upper Louisa County.

Mr. H. W. Metzger next addressed the commission. He referred to the rich agricultural territory in Muscatine County, and asked for assistance in the protection of the river front at Muscatine.

Mr. C. T. Spickler, commissioner Drury Drainage District, presented a paper, briefed below:

¹ Miles above Cairo.

1926-26. Spickler, C. T. Requests that levee on Illinois shore, from Drurys Landing to Copperas Creek, be protected by riprap. (Nov. 10, 1913.)

There being no others present desiring to be heard, the meeting adjourned at 3.30 p. m.

NOVEMBER 11, 1913.

The commission met at 9.25 a. m., on board the steamer *Mississippi*, at Burlington, Iowa (¹428), for the purpose of giving a hearing.

The attendance was the same as at the preceding meeting.

The following-named gentlemen were present for a hearing:

Mr. J. H. Pettibone, chairman, Flint Creek-Iowa River levee district; Hon. John J. Seerley, attorney, Flint Creek-Iowa River levee district; Mr. R. C. Waddle, county engineer, Des Moines County; Mr. W. F. Gilman, of the commercial exchange; Mr. J. L. Waite, chairman committee from commercial exchange; Mr. F. W. Parrott, county auditor; Mr. Ben Poor, city solicitor; Mr. Thos. Wilkinson, president Upper Mississippi River Improvement Association; Mr. H. Krueger, city commissioner; Mr. R. D. Siefken, member Flint Creek-Iowa River levee district; Mr. Al. Schwaler, member Flint Creek-Iowa River levee district; Mr. S. F. Wilson, Wapello, Iowa; Mr. O. F. Farmer, Wapello, Iowa; Mr. W. O. Jones, Wapello, Iowa, and others.

Mr. Pettibone stated that Hon. John J. Seerley would speak for the Flint Creek-Iowa River levee district.

Mr. Seerley addressed the commission. He read and filed a paper, briefed below:

1926-27. Seerley, Hon. John J., attorney. Submits statement as to conditions and needs of Flint Creek-Iowa River levee district. Requests Government aid on the levee, especially that part which was never completed. (No date.)

Mr. Seerley stated he had been requested by the attorney of the Louisa County levee district to call attention to the needs of the levee in that county, from Muscatine down toward Oakville, and stated that the general remarks in his paper would cover those levees also.

In reply to questions, Mr. Seerley stated that the levee district he represents is organized under State laws, the limit of taxation for levee work being fixed at 10 mills on the assessed value of both real and personal property in the district. He estimated the assessed value as about one-fourth of the actual value of the property at the time the assessment was made. He stated that efforts have been made to have the limit of taxation increased, but without success. He estimated the actual present value of bottom lands in the district at from \$50 to \$225 per acre and stated that the assessed valuations, having been made before the drainage district was completed, when the lands were much less valuable than now, are now too low and will probably be considerably increased at the next assessment, within the next year or so. He requested Government assistance on the levees and expressed a willingness on the part of the local people to contribute liberally toward levee work.

Mr. Pettibone handed in a statement prepared by the engineers of the district, briefed below:

1926-27-1. Harman Engineering Co. Statement of conditions and needs in Flint Creek-Iowa River levee district. (Nov. 10, 1913.)

There being no others present desiring to be heard, the meeting adjourned at 5.50 a. m.

NOVEMBER 11, 1913.

(Second meeting.)

The commission met at 1.20 p. m. on board the steamer *Mississippi* at Montrose, Ill. (¹397), for the purpose of giving a hearing.

The attendance was the same as at the preceding meeting.

The following-named gentlemen were present for a hearing.

Mr. M. E. Bannon, engineer, drainage district No. 3, Henderson County, Ill.; Mayor E. D. Crooks, Mr. J. B. Kiel, Mr. R. H. Young, Montrose, Iowa, and others. Mr. Bannon spoke first. He referred to the caving bank just below Oquawka, Ill. (¹440), where he stated that the river is cutting into the Illinois shore at Prairie Bluff, and the bank has caved at the rate of from 100 to 150 feet in the last 3 or 4 years; he stated that the revetment placed at this point by the Government has been destroyed by the river cutting behind it, and that there would be danger to a levee if it might be placed there.

¹ Miles above Cairo.

He read and filed a statement, briefed below:

1926-28. Commissioners, drainage district No. 3, Henderson County, Ill. Statement of conditions and needs of district, especially caving bank just below the village of Oquawka, Ill. Map accompanying. (Nov. 10, 1913.) Map 508.

Mr. E. D. Crooks, mayor of Montrose, next addressed the commission. He stated that the Mississippi River Power Co.'s dam has backed the water up to such extent as to destroy the boat landing at Montrose, and that the company, in accordance with an agreement with the town, has constructed a new landing, but that the new one is not in accordance with the specifications. He read and filed a paper, briefed below:

1926-29. Mayor of Montrose. Submits statements as to manner in which new levee and landing constructed at that place by Mississippi River Power Co. is deficient. (Nov. 11, 1913.)

The president of the commission informed both Mr. Bannon and Mayor Crooks that the matters presented by them are under the jurisdiction of the district engineer officer, and that he would call the district officer's attention to them.

There being no others present desiring to be heard, the meeting adjourned at 1.30 p. m.

NOVEMBER 11, 1913.

(Third meeting.)

The commission met at 4.15 p. m. on board the steamer *Mississippi*, at Keokuk, Iowa (¹ 386), for the purpose of giving a hearing to Mr. J. P. Dickson, of Keokuk, Iowa.

The attendance was the same as at the preceding meeting.

Mr. Dickson spoke briefly as to the levee situation near Keokuk and on the Des Moines River, and stated that he is interested in knowing whether the method of construction of these levees is properly understood, and whether the United States will build the levees and let the local people take care of drainage, or whether the United States will handle both levees and drainage. He handed in a list of 21 suggestions as to the method of handling river improvement work, briefed below:

1926-30. Suggestions as to method of river improvements, by J. P. Dickson. (N. date.)

There being no others present desiring to be heard, the meeting adjourned at 4.25 p. m.

NOVEMBER 11, 1913.

(Fourth meeting.)

The commission met at 5.30 p. m. on board the steamer *Mississippi*, at Warsaw, Ill. (¹ 381), for the purpose of giving a hearing.

The attendance was the same as at the preceding meeting.

The following-named gentlemen were present for a hearing:

Mr. Joe Fry (chairman), Mr. R. B. Johnson, Mr. Louis Lamet, and Mr. Walt Von Pappelendam, Hunt levee and drainage district.

Mr. Lamet addressed the commission. He read and filed a paper, briefed below:

1926-31. Commissioners, Hunt levee and drainage district, Hancock County, Ill. Statement of conditions and needs. (Nov. 10, 1913.)

In reply to questions, Mr. Lamet stated that in 1903 the lower 6 miles of their levee was about 1 foot above high water; that the maximum value of land in the district about \$90 per acre and the average value about \$60 per acre. As to drainage, he stated that the drainage of Hunt levee and drainage district is down into Lima Lake in the Lima Lake district just below, thence to the Mississippi River, locks and pumps being provided below Lima Lake; that negotiations are being carried on between the two districts as to the proper division between them of the expense of drainage, but that no agreement has been reached, as the Lima Lake district wishes the Hunt district to pay a higher percentage of the cost of the drainage system than the Hunt district regards as equitable; that 8 miles of the levee in Adams County in the Lima Lake district was built by the Hunt drainage district, as well as part of the cross levee, and that the Hunt district also contributed toward the expense of the locks, the expenditures in Lima Lake district by the Hunt district being understood to have been

made in consideration of their having the right to use Lima Lake as a reservoir, although there is no written agreement to this effect. It was stated that no muck ditches are used in levee construction in the district, except in repairing some of the breaks; that the distance from the base of the levee to the borrow pits, which are on the land side of the levee, is about 30 to 40 feet; that the levees are in danger when the stage at Keokuk (¹ 386) is at 19 feet for as long as a week; and that the highest recorded water at Warsaw (¹ 381) was 22½ feet, in 1903.

He further stated that the needs of the district include repairs to the levee, particularly to the lower 6 miles, and drainage works; that the estimated cost of the levee work regarded as necessary is \$50,000, and of the drainage works about \$40,000; that the district some years ago bonded itself to the extent of \$75,000, all of which was spent on the levees, and of which \$30,000 still remains unpaid; that it could probably sell more bonds and is preparing to float an issue of \$40,000 worth of bonds to care for the drainage system. He added that the Government expenditure on the levee has been about \$30,000, and that the district has had no State aid.

There being no others present desiring to be heard, the meeting adjourned at 6.05 p. m.

NOVEMBER 12, 1913.

The commission met at 10 a. m. on board the steamer *Mississippi* at Quincy, Ill. (1347), for the purpose of giving a hearing.

The attendance was the same as at the preceding meeting except Col. Beach, excused.

The following-named gentlemen were present for a hearing:

Dr. L. H. A. Nicholson, representing Indian Grave Levee district; Mr. J. H. Best, secretary Lima Lake drainage district; Mr. E. B. Monroe, representing Fabius River drainage district; Mr. C. T. Llewellyn, attorney for Des Moines and Mississippi levee district No. 1, Clark County, Mo.; Mr. R. M. Emerson, representing the Sny Island levee drainage district; Mr. E. J. Chamberlain, engineer, Sny Island Levee drainage district, and others.

Mr. Nicholson first addressed the commission, on behalf of the Indian Grave levee and drainage district. He stated that the district was organized in 1880, and extends along the east side of the Mississippi River from about 6 miles below Quincy to 32 miles above the point of beginning; that \$500,000 has been expended in the district since its organization, of which sum the Government has expended about \$100,000. He further stated that his district is not asking for levee enlargement or strengthening, but would like to have the Government close Smoot Chute opposite section 28, and riprap about one-half mile of levee in that vicinity to prevent erosion; they also desire the extension of the levee from section 27 down to the railroad bridge, which would give a continuous levee from Warsaw to Quincy, some 30 miles. He handed in a statement and map, briefed below:

926-32. Commissioners, Indian Grave levee and drainage district. Statement of organization, expenditures, conditions, and needs. (Nov. 11, 1913.) Map accompanying. Map 509.

In reply to questions he stated that their last overflow was in 1903, when the levee broke; that they have no pumping plant for drainage now, but contemplate having one soon; that the lands are worth from \$25 to \$80 per acre, the district comprising about 20,000 acres, and 200 families, being 3 miles wide at the upper end and 2 miles wide at the lower end. He also stated that the levee extension asked for would not claim any land, but would be of benefit to the bay, and would reduce the lift at the pumping plant.

Mr. J. H. Best next spoke on behalf of Lima Lake levee and drainage district. He stated that they experienced trouble from the chute on the east side of the river immediately opposite Canton, Mo. (¹ 363), the dam which formerly closed the chute having washed out; and that they desire the chute closed, the result of which will be that the water from Lima Lake will run out of the lake at a 2-foot lower stage than it does with the chute open. He also stated that about 3 miles of the Lima Lake levee is exposed to erosion and should be riprapped. In reply to a question, he stated he did not remember the Canton Dike having been repaired in recent years.

¹ Miles above Cairo.

He filed a statement, briefed below:

1926-33. Commissioners, Lima Lake levee and drainage district. Statement of organization, expenditures, conditions, and needs. (Nov. 11, 1913.)

Mr. E. B. Monroe next addressed the commission on behalf of the Fabius River drainage district. He stated that his district is located in Missouri opposite Quincy, Ill. (¹ 347), and when completely organized will embrace 13,000 acres of land, besides which they hope to include 4,500 acres additional in Lewis County; that no work has been done in the district, the work of organization being now in progress; that the district embraces fertile lands, and that Government aid is desired in their protection.

He filed with the commission a statement and map, briefed below:

1926-34. Dearing, John A., president Fabius River drainage district. Statement of organization, conditions, and needs. (Nov. 11, 1913.) Map accompanying. Map 510.

Mr. C. T. Llewellyn next addressed the commission on behalf of the Des Moines and Mississippi levee district No. 1, Clark County, Mo.

He stated that his district is located in northeast Missouri, being bounded on the north by the Des Moines River, east by Mississippi River, and south by Fox River comprising 11,000 acres of land, with a population of about 1,800 or 2,000. The first levee organization was in 1855, known as the old Egyptian Co.; the district was reorganized in 1903 under the new State laws; the new district has built approximately 17 miles of levee, using the old Egyptian levee in the new levee line, and in addition has constructed 7 miles of drainage ditches. He further stated that their immediate needs are more adequate protection of the Mississippi River levees, especially at Alexandria (¹ 381), where the levee is on the bank of the river, and where a break was threatened in 1912, but was averted by emergency work done by the Burlington Railroad; they also desire mattress protection along part of the Mississippi River levee; he added that the construction of the Government dikes along the Illinois shore opposite this locality has increased the danger to their levees.

In reply to questions he stated that the last overflow of his district was in 1903, when it was all under water; also that the Des Moines River levee broke in 1905, flooding a large portion of the district; that high water reaches to within 18 inches of the top of their levees; that the Mississippi River levee in his district is about 2 miles long; that the levees in his district are fully as high—possibly higher—than those in Iowa above; that the average height of the levees is about 6 feet; and that the protection work they desire is the protection of the levee itself rather than of the bank.

He handed in a paper and map, briefed below:

1926-35. Information regarding the Des Moines and Mississippi levee district No. 1, Clark County, Mo. (No date.) Map accompanying map 511.

In reply to a question, the Lima Lake district representatives stated there has been no break in the Bear Creek levee for 8 or 9 years, and that that levee has not been restored since 1903.

Col. Beach entered and took his seat while Mr. Llewellyn was speaking.

Mr. R. M. Emerson next addressed the commission on behalf of the Sny Island levee drainage district.

He stated that his district begins about 6 miles below Quincy (¹ 347), and extends south 52.8 miles, extending over three counties and embracing 110,000 acres of land, and ending at Hamburg Bay (¹ 282); that there has been spent in the district in all fully one and one-half million dollars in levee and drainage work, about \$350,000 of which was for drainage; that they have a very good levee now, but that it still needs a great deal of work upon it, and that they desire the levee standardized as far as possible; that their drainage passes out at the lower end of the district, which is open, and that their immediate need is the extension of the levee 2 or 3 miles in the vicinity of Hamburg Bay at the lower end of the district; that they want the dikes built up so as to cut the water off from the sloughs, which would reclaim 3,000 or 4,000 acres of land. In reply to questions he stated the last break they had was in 1903, opposite Louisiana, Mo. (¹ 301); that they have received no State aid; that the district is now in a financial condition, and is spending all its money in drainage. He referred to the active part taken by the Sny Island district people in securing appropriations for river work.

He handed in a paper, briefed below:

1926-16-1. Chamberlain, E. J., engineer Sny Island levee drainage district. Statement of organization, expenditures, etc. (Nov. 11, 1913.)

Mr. R. N. Anderson stated that plans are under way for the construction of a short piece of levee just below Quincy (¹ 347) to connect with the high lands below; that a levee district is being organized in that territory, and that when this work is completed the levees on the east bank will be continuous from Warsaw (¹ 381) to the ridge below Quincy.

Mr. E. J. Chamberlain, engineer for the Sny Island levee drainage district, stated that the levees of his district need enlargement to resist the high waters; that the levees have a 5-foot crown and are 2 feet lower than they should be, the plane of high water having been raised 2 feet since their construction by reason of other levees along the river. He stated the cross section of his levees in regions of quicksand has a 3 to 1 slope on the outside where protected by a foreshore of brush and a berm on the land side; where exposed to wave action, he gives a 4 or 5 to 1 slope; that the banquette on the land side was placed there on account of the borrow pits being on the land side—financial conditions having necessitated a departure from preferred engineering methods, and that in some places a seep ditch 2 or 3 feet deep has been permitted. He stated regions of quicksand are found from Cincinnati Landing (¹ 316) southerly for 5 or 6 miles; also just above the Wabash Railroad at Hannibal (¹ 329).

In reply to questions, he stated the immediate needs are repairs to the levee through quicksand regions and protection of the bank below Clarksville (¹ 291), where the river is at the foot of the levee, and stated revetment should be placed at this point rather than to move the levee back; also that some work is needed at Gilgal.

In reply to questions, Mr. Emerson stated Sny Island district has no bonded indebtedness; that the tax is 22 cents per acre per year; that a special assessment of \$160,000 was raised and expended for drainage within the last two years, and that a petition will be circulated within the next 10 days to raise an additional special assessment of \$200,000 for drainage; and that their regular maintenance funds amount to about \$18,000 or \$20,000 per year.

There being no others present desiring to be heard, the meeting adjourned at 1 a. m.

* * * * *

NOVEMBER 13, 1913.

(Second meeting.)

The commission met at 2 p. m. on board the steamer *Mississippi* at Alton, Ill. 216), for the purpose of giving a hearing.

The attendance was the same as at the preceding meeting, except Judge Taylor, excused.

The following-named gentlemen were present for a hearing:

Mr. W. H. Joesting, manager Alton Board of Trade; Mr. W. J. Boals, secretary levee district No. 1, St. Charles County, Mo.; Mr. Ben B. Mennemeier, president levee district No. 1, St. Charles County, Mo.; Hon. J. J. Brenholt; Hon. Joseph Faulk, mayor; Mr. George B. Logan, representing levee district No. 1, St. Charles County; Mr. John Schwab, city engineer; Mr. Lowden, and others.

Mr. Joesting first addressed the commission. He stated that he appeared in the interest of the improvement of the river front at Alton. Upon being informed by Mr. Townsend that the commission's present investigations in this part of the river embrace questions of levee work only and that the question of river-front improvement should be taken up with the district engineer officer, he stated that the matter of river-front improvement would not be presented to the commission.

Mr. John Schwab, city engineer, called attention to the low ground below the Alton landing, about 1,100 feet wide by 1 mile long, subject to overflow, which it is desirable to have protected by levees.

Mr. George B. Logan next addressed the commission in behalf of levee district No. 1, St. Charles County, Mo.

He stated that his district lies across the river from Alton, beginning about 3,000 feet above a point opposite the upper end of Alton, and extending downstream; that the district was organized two years ago under the county court act, which requires a vote of a majority of the landowners before any work can be done; that certain preliminary work was done—a survey, report, and estimate of cost having been completed, and benefits assessed; that a vote was then taken to determine whether or not work should be done at the estimated figure, and the vote failed to carry, the failure

¹ Miles above Cairo.

being thought to have been due to the fear that the work might not be substantially or thoroughly done and that the levee could not be held. He stated that there are 2,500 acres, 75 landowners, and 450 residents in the district as originally organized, but that a plan has now been devised to enlarge the district to include 4,500 acres. As to overflows, he stated that the land was overflowed in 1903, 1904, 1908, and 1909, the floods coming entirely from the Mississippi, the estimated loss of crops during those floods being \$600,000, and these conditions have discouraged the landowners, who, in consequence are using the land to only about 40 per cent of its capabilities. As to existing levee protection, he stated there is only a small private levee, which protects a few hundred acres from ordinary overflow. He asked for assistance from the commission in the construction of levees in this district, and stated the assurance of such assistance would go far toward bringing out a unanimous vote for the levee by the local landowners. He estimated the cost of the levee at \$30,000 for the smaller district and \$50,000 for the larger one. He filed with the commission a report, briefed below, of Mr. W. J. Schlick, assistant drainage engineer, Department of Agriculture.

1926-10-3. Schlick, W. J. Report on preliminary examination of West Alton Levee District No. 1, St. Charles County, Mo. (January 11, 1913.)

Mr. W. J. Boals spoke briefly, saying he attributed the failure to carry the vote for levees in the district to the discouragement of the people because of loss from floods in the years named by Mr. Logan, and also to their fear of being unable to build levees that would hold. He asked for Government assistance.

Mr. Lowden spoke briefly, stating he hoped the commission would not be prejudiced by the fact that the majority of the landowners in the district had failed to vote for the levees; that the majority had signed the petition for the levee district, but that the assessments seemed to have been made in such way as to be unsatisfactory to some of the landowners.

There being no others present desiring to be heard, the meeting adjourned at 2.20 p. m.

NOVEMBER 13, 1913.

(Third meeting.)

The commission met at 5 p. m., on board the steamer *Mississippi* at St. Louis, Mo. (191¹), for the purpose of giving a hearing.

Present, all the members and the acting secretary.

Absent, none.

The following-named gentlemen came before the commission for a hearing:

Mr. G. L. Tarlton, chairman trustees of East Side levee and sanitary district; Mr. M. B. Joyce and Mr. T. E. Gillespie, attorneys for East Side levee and sanitary district; Mr. R. E. Conway and Mr. E. R. Jones, trustees for East Side levee and sanitary district; Mayor Chamberlin, mayor of East St. Louis; Mr. Ed. Hilker, president Commercial Club, Granite City, Ill.; Mr. W. C. Thresher, president Commercial Club, East St. Louis, and others.

Mr. Tarlton spoke first. He read and filed with the commission a paper, briefed below:

1926-37. East Side levee and sanitary district. Statement of conditions and needs of the district. (November, 1913.) Map attached. Inclosure 37-1 accompanying.

Mr. M. B. Joyce next addressed the commission. He referred to the railroad and other industries in the district, and urged the importance to the whole country of preventing interference by floods with the railroads centering in East St. Louis. He stated that the district had been subject to overflow for many years, but that after the flood of 1903 a plan was devised to have an act passed by the Illinois Legislature that would enable them to form a sanitary district in two counties; that the act was passed, the district formed, and that about two and one-half million dollars have already been expended in levee and drainage work in the district; that the constitutional limit of bonded indebtedness, which is 5 per cent of the assessed valuation of all property in the district, has been reached, which makes it impossible to raise money to complete the work within a reasonable time to furnish adequate flood protection, as no new work can be let for some time.

In reply to a question it was stated that of the amount named as having been expended, about \$850,000 has been expended on the Cahokia Creek diversion canal the balance having been used on levee work, interest on bonds, right of way, administration, etc. He explained the purpose and method of the diversion of Cahokia

Creek by a canal to the Mississippi River at the northern end of the district. He requested aid from the Government in order to provide adequate protection within a reasonable time, urging that the people have done all they could, and now ask assistance on the principle that the Government will help those localities that have shown an earnest intention to help themselves.

Mayor Chamberlain spoke briefly as to the taxation of the people on the east side of the river, saying the population is essentially an industrial population, and that taxation falls principally upon the small home owner of moderate means; he stated that the rate of taxation is \$7 to \$8 on \$100 valuation, \$2.86 of which goes for levees alone; that the levee work is at a stage now where work will be more valuable than at any other time; that the railroads are taking an active interest in the work, and subscribed the preliminary \$30,000 to get the district organized and the act passed. He requested Government aid in the work, stating that the expense of caring for the flood protection and drainage has been great and no locality in the valley has done more to help itself than this district. In response to questions he stated that the assessed valuation of property in the district is one-third of the assumed real valuation; that he believes the assessment is a fair assessment as such things go; that the assessors return the property at from 65 per cent to 70 per cent of its market value and fix the assessed value at one-third of this figure, this being the uniform rule throughout the State. The railroads are assessed by the State Board of Equalization and the local authorities have nothing to do with this assessment. The rate of taxation levied on the railroad property is the same as that upon other properties in the district.

Mr. T. E. Gillespie, attorney for the district, spoke next. He stated his opinion that in common with railroad property throughout the country the property of the railroads in the east side levee and sanitary district is not assessed as high as it should be, but this is beyond the control of the officials of the district. He stated that the district has received no assistance from the State or any other source, and that the funds for preliminary work were raised by the property owners, who hoped that the district would be organized and adopted by the residents. He spoke of the situation at Cairo and of the assistance given by the United States Government to levee work at that place, and referred to the possibility of the conjunction of a flood from the upper Mississippi with one from the Missouri occurring at the same time, and stated if such should happen before the levees in his district are adequately built and protected they would probably be destroyed. He stated that bonds have been issued to the extent of the constitutional limit, and mature serially, about \$300,000 worth maturing each year, so that as each series matures and is paid off additional bonds to the amount of those paid off may be issued. The district revenues from all sources are all pledged for a full year to come, but after that the district will have about \$300,000 per year available for their work. He estimated the cost of adequately protecting the levee already built at \$600,000, and of the completion of the levee at the southern end of the district at one and one-half or two million dollars more.

Mr. Conway spoke briefly in regard to the extensive railroad freight terminals in and around East St. Louis.

There being no others present desiring to be heard, the meeting adjourned at 5.40 p. m.

NOVEMBER 14, 1913.

The commission met at 9 a. m. on board the steamer *Mississippi* at Chester, Ill. (¹ 115), for the purpose of giving a hearing.

The attendance was the same as at the preceding meeting.

The following-named gentlemen were present for a hearing:

Mr. Emery Andrews, attorney for Kaskaskia Island drainage and levee district; Mr. A. E. Chrisler, Chester, Ill.; Mr. T. N. Jacobs, engineer.

Mr. Andrews addressed the commission. He stated that his written statement as to Kaskaskia Island drainage and levee district was being corrected and would be mailed to the commission at Memphis.

He stated that the island of Kaskaskia contains about 14,000 acres of very fertile land, but that the people have made few public improvements on the island, being handicapped by the fact that part of the lands were held as "commons" under the French grant of 1722 and under the Illinois constitution of 1818; that under the constitution of 1848 the "commons" had been leased for a number of years, the revenues going to educational purposes in the town of Kaskaskia; that a few years ago, under a special act passed by the Illinois Legislature, the sale of the "commons" was effected; the net proceeds of the sale amounted to \$252,000, which amount, under the act, was placed in the State treasury, the income to be used for the benefit of the schools. The

¹ Miles above Cairo.

highest price received at this sale was \$69 per acre. Efforts are now being made to have a special act passed granting larger powers to the district in the matter of raising taxes for levee purposes, and also granting authority to use, in levee work, the excess of the income from the \$252,000 not needed for school purposes, the income being \$12,500 per annum, and only about \$3,000 being needed for the schools.

He further stated that the land has been overflowed on an average every other year, causing a loss of about half of the crops, and in 1903 was nearly all under water; that the people are willing to take care of internal improvements on the island—levees, ditches, and pumping—and desire the Government to protect the east river bank, in order to save the land and enable them to build the levee nearer the bank, the nearness of the levee to the bank having a direct bearing on the amount of revenue and the probable success of the proposed bond issue.

Col. Townsend informed him that the protection of the bank referred to is part of the accepted program of work under the St. Louis district engineer office, and will be done when the relative importance of this work as compared with other needed work at other localities in the district is such as to justify the application of part of the available appropriations for this purpose.

Mr. Andrews stated that from preliminary surveys and estimates he estimates that the internal improvements will cost from \$25 to \$30 per acre. He stated that the engineers hope to have their full report ready by the middle of December, after which plans will be formed, right of way secured, assessments of benefits made and filed with the circuit court, and upon confirmation of the assessments by the circuit court bonds will be offered for sale and the district will then be ready to do the work.

He further stated that they have no money at all available for work now; that the total value of the island is probably over half a million dollars; that some land has sold within the last 18 months for \$100 per acre; and that the elevation of the island is about that of mean high-water stage. In reply to a question, he stated that the plan contemplates inclosing the island within a levee, which will inclose about 10,000 acres of land, the drainage being handled by a pump at the lower end; that they have considered the plan of connecting with the levees on the right bank, but abandoned the idea because joint action by two States would be required.

There being no others present desiring to be heard, the meeting adjourned at 9.25 a. m.

NOVEMBER 14, 1913.

(Second meeting.)

The commission met at 2.20 p. m., on board the steamer *Mississippi*, at Cape Girardeau, Mo. (1 54), for the purpose of giving a hearing.

The attendance was the same as at the preceeding meeting, except Judge Taylor, excused.

The following-named gentlemen were present for a hearing:

Mr. A. Sessions, Anna, Ill.; Mr. Ira Hastings; Mr. Joel Dunn, engineer, Gorham, Ill.; Mr. D. A. Glenn, president, and Mr. A. H. Hinchey, secretary, Cape Girardeau Commercial Club; Mr. Joseph Bunch, president East Cape Girardeau and Clear Creek drainage district, and others.

Mr. Hastings spoke first, on behalf of the East Cape Girardeau and Clear Creek drainage district. He stated that his district is in Alexander County, Ill., and contains 9,335 acres; it was organized 5 years ago, and about 11 miles of levee and some ditches have been built, at a total cost of about \$90,000 for levees and drainage, the funds having been secured from assessments on the land, bonds running 20 years having been issued. He further stated that when the levee was completed the protection was thought to be ample, but the closing of the basin below Cape Girardeau, and the building of the Thebes bridge, have caused the flood plane to rise, and in 1912 the waters backed up against the levee and caused a crevasse, flooding about half the district. He also stated that the Little River drainage district contemplates emptying the waters from Castor and Whitewater Rivers into the Mississippi River opposite his district, which will throw an additional burden upon their levee. He asked the commission to assist to the extent of raising the levee 2 feet along his district, the estimated cost of which is \$45,000, based on the cost of the original levee. He explained that the territory on the east bank of the Mississippi between Gale, Ill., and Degogni Creek, containing about 90,000 acres, is divided into six levee and drainage districts, the names, locations, and acreage of which are set out in a paper which he would submit, and that when the chain of levees in the six districts is completed it will be unnecessary to maintain cross and rear levees. The lowest district is organized and its levees completed; and the two upper districts are also organized; but the organization of the three interior districts is not yet completed. He gave the width of the territory

referred to as from 4 to 10 miles, and the height of levees in his district as from 6 to 8 feet, adding that the levees in the districts above will be 2 feet higher. He urged that assistance be given to all six of the districts, as they are interdependent, and as the levee will also protect 40,000 acres of land not in any district. He handed in a paper, briefed below:

1926-38. East Cape Girardeau and Clear Creek drainage district. Statement of conditions and needs of the district; also statement and data covering six levee districts from Gale, Ill., to Degognia Creek, Ill. (Nov. 14, 1913.)

Mr. Sessions next addressed the commission in behalf of the Clear Creek drainage and levee district. He stated the officers and attorney of the Preston levee and drainage district are now in court in connection with the organization and levying of assessments for that district, and will mail their statement to the commission. He described the limits of the Preston district, and stated that the levee in that district will be 3 feet above the highest water, and is estimated to cost \$120,000.

As to Clear Creek drainage and levee district he stated that the matter of assessing benefits is now being worked out, and that the assessment roll amounts to \$245,000, which will be a heavy burden on the district, which contains 18,000 acres; that the levee is to be 4 feet above the high water of 1903, with 4-foot crown, 4 by 4 foot duck ditch, and a slope of 3 to 1 on each side; yardage of levee, 556,660 cubic yards, the total cost of which is estimated at \$111,332, at 20 cents per cubic yard. He stated that it will be impracticable to take care of the drainage by pumps, and that it is proposed to close the mouth of Clear Creek and send all the hill drainage through Horse Creek, emptying into the Mississippi River at Gale, Ill., which will leave only the Big Muddy River entering the Mississippi between Degognia Creek and Gale. This diversion is being undertaken by the North Alexander drainage district, which lies south of the Clear Creek district and east of the East Cape Girardeau and Clear Creek district. This drainage can not be handled by a pumping plant, and the only solution is an open outlet protected by a back levee. The levee will join that of the East Cape Girardeau and Clear Creek district, and will extend 7 miles in a northerly direction; it will be 5 feet above the high water of 1903, with a 4-foot crown and 3 on 1 slopes, and is estimated to cost \$66,884, the total estimated cost for levees and drainage being \$100,000. The assessment roll is now being spread, and the district hopes to be ready to begin work within 90 days.

In reply to questions he stated that the reason for dividing the territory into six levee districts is found in the existence of local disagreements. He filed a paper, briefed below:

26-39. Clear Creek drainage and levee district. Statement of conditions and needs. (No date.)

26-41. North Alexander County drainage district. Statement of conditions and needs of the district. (No date.)

Judge Taylor entered and took his seat while Mr. Sessions was speaking. Mr. Joel Dunn, engineer of the Degognia and Fountain Bluff levee and drainage district, next addressed the commission.

He stated his district begins at Degognia Creek, 10 miles below Chester, and extends 10 miles down the river to the big hill above Grand Tower; that the levee, built two years ago, was built from 2½ to 2.8 feet above 1903 high water, which was then thought to be ample, but on account of conditions that have resulted from the closure of the Francis Basin and other changes they now fear the levee is not high enough, as the 1912 flood rose 4½ feet higher on their levee than was anticipated in proportion to stage at other points. His district contains 29,609 acres and has issued bonds to the extent of \$162,000. The levee has a section as follows: About 1¼ miles at upper end has 4-foot crown and 2 to 1 slope, which is increased at Cottonwood Tree above Farmers Landing to 8-foot crown and slope of 3 to 1; for about 1 mile farther down a slope of 2 to 1 is used with 5-foot crown; and across sloughs a slope of 3 to 1 with 8-foot crown; the average height of the levees is from 2 to 10 feet, the greatest height, across a slough, being 17 feet. His district being the upper one of the six, the importance of the levee line as a protection to all six of the districts is manifest. He stated they want their levee raised 2 feet, which would make it 4½ feet at all points above 1903 high water, and given a slope of 3 to 1 on each side and a uniform width on top of 6 feet, which he estimated would require 510,000 cubic yards and would cost \$102,000. The cost to the district for drainage has been about \$20 per acre and for levees about \$10 per acre. He asked for aid from the commission. He also called attention to need

of revetment at Lower Wilkinson Landing, about 1 mile below Wilkinson Island, and at Brunkhorst Landing, where the caving bank is within 200 feet of the levee.

He filed a paper, briefed below:

1926-40. Degognia and Fountain Bluff levee and drainage district. Statement of conditions and needs of the district. (Nov. 10, 1913.)

Another paper handed in at the meeting is briefed below:

1926-42. Grand Tower drainage and levee district. Statement of conditions and needs of district. (Nov. 13, 1913.)

Mr. D. A. Glenn, president Cape Girardeau Commercial Club, thanked the commission for the hearing and indorsed what had been stated by preceding speakers.

There being no others present desiring to be heard, the meeting adjourned at 3 p. m.

COPIES OF PAPERS PRESENTED TO THE MISSISSIPPI RIVER COMMISSION AT PUBLIC HEARINGS HELD ALONG THE MISSISSIPPI RIVER BETWEEN ROCK ISLAND, ILL., AND CAPE GIRARDEAU, MO., NOVEMBER 10 TO 14, 1913, RELATIVE TO LEVEES BETWEEN THOSE POINTS.

File 1926-22.

STATEMENT OF BAY ISLAND DRAINAGE AND LEVEE DISTRICT.

(Presented at Rock Island, Ill., Nov. 10, 1913.)

Bay Island drainage and levee district No. 1, county of Mercer and State of Illinois, was organized in the county court of Mercer County, Ill., in 1907. The total acreage in the district is 19,330. The first cost of the work was \$241,794. That work included a levee along the east bank of the Mississippi River, extending from a point 1 mile south of the Mercer-Rock Island line to the Sand Bluff, in section 19, township 14 range 5, in Mercer County.

The river levee is approximately 14 miles in length and is built with its crest 4 feet above high-water mark. The ditches are a main ditch extending from Glary Lake, on the north line of the district, to the pumping station located in section 25, township 14-6, and which ditch is approximately 12 miles in length, including laterals and watercourses which are made a part of the ditch. There are also some other ditches in the eastern part of the district.

A pumping station was built in section 25, township 14-6, costing approximately \$85,000, and has two 60-inch centrifugal pumps, which thus far have been sufficient for the needs of the district.

An annual maintenance tax of from 30 to 60 cents an acre has been levied to keep the system in operation. Most of the expense is incurred for pumping water out of the district.

Approximately 60 per cent of the lands in the district are now under cultivation, and these lands will produce on an average at present prices \$25 per acre. The clearance of the lands in the district are rapidly being cleared. At the present time a fair average price for the cultivated lands would be \$100 an acre and for the timbered lands \$50 an acre. The lands within the district are fit for cultivation and there are no deposits of sand at any place sufficient to interfere with agriculture. In some places considerable strips of the Mississippi River levee are exposed to wave and wind action, and this has caused in past years some considerable erosion and wear of the levee.

The present commissioners of the district are Don S. Prentiss, Richard H. Roberts and Matthias F. Prouty, all of New Boston, Ill. The attorney for the district is W. Graham, of Aledo, Ill., and the engineers are the Harman Engineering Co., 120 Madison Avenue, Peoria, Ill.

File 1926-23.

MUSCATINE, IOWA, November 10, 1913.

From: The Civic Association of Muscatine, Iowa.
To: The president Mississippi River Commission.
Subject: Levee improvement, Muscatine, Iowa.

1. Harbor line established in Muscatine, Iowa, in 1907, by Secretary of War W. H. Taft. Remains unchanged to-day. Several years later Government work started along harbor line, but never finished. Same was riprapped with willows and lime rock below high bridge. (See pictures.) Large stone marks spot where work ended.
2. It is earnestly desired by Civic Association of Muscatine that work be extended past city to the southern limits of same. (See map.)
3. High shores wash each year and low lands overflow. (See pictures.)
4. It is suggested that harbor line be riprapped high for shore protection, as promised by act of Congress. February 25, 1913.

EMMA L. BRAUMWARTH, M. D.,
Treasurer Civic Association, Muscatine, Iowa.

SUSAN F. STONE,
Corresponding Secretary Civic Association.

LILLIE W. HOPKINSON,
Recording Secretary.

MUSCATINE CHAMBER OF COMMERCE.
By C. M. WEBER, *Vice President.*

(Inclosures withdrawn and kept by petitioners.)

File 1926-24.

The Muscatine Island levee starts at the city of Muscatine, Iowa, and runs along the west bank of the Mississippi River to a point in Louisa County, Iowa, situated in section 9, township 75, range 11 west, of the fifth principal meridian, at the head of a timber tract known as the Big Timber. At this point it is deflected to the south-west, and runs along the western or prairie side of this timber tract, and returns again to the river bank at the lower end of this timber tract, leaving a distance of about 4 miles of the river bank unprotected by a river-bank levee, and about 1,300 acres of land exposed to overflow from the river. The reason why the levee was thus deflected around this timber land is that when the levee was constructed 30 years ago the science of levee building was not then understood as it is at the present time, and it was not then considered feasible to keep the levee along the river bank through the timber. Now this tract should be leveed, and the river bank protected by riprap from further erosion, in order to preserve the power of the river by keeping it within its banks, and to redeem the land from overflow. But the levee, being built as it is, leaves too small a number of acres to bear the burden alone of constructing a proper levee.

We who have passed our lives in this locality know that, since the wing dams were constructed by the Government along the eastern or Illinois bank of the Mississippi River, that the force of the stream has thereby been thrown upon the Iowa bank, and the erosion of the Iowa bank has been much more rapid than it was before the placing of those wing dams. And that there are places along the river bank of the Big Timber that should in justice be riprapped by the Government. Near the lower end of the Big Timber the river has washed away a strip of land, it is claimed, that was fully 2 rods wide and about half a mile long, during the past two years, and if this is not stopped by riprap, the river will soon be connected with the ponds and boughs back of the timber, and much land which can be made valuable will be cut off into a river island.

Just below the Big Timber where the levee returns to the river bank, there was one of these places that was being rapidly eaten away by the river, to the great danger of the levee, until the Government placed about a mile and a half of riprap there. This stopped the erosion at that point and the levee stands to-day, saved from being washed away by that piece of Government work.

In many localities the Government is building levees where the burden of construction is too heavy upon the land to be protected thereby. If this 4 miles of levee could be constructed, then the present levee, which is deflected around the Big Timber would not be needed, and the present local tax which keeps up the deflected levee would then be applied to the river-bank levee. The river-bank levee would keep the water back, and the seepage would be greatly diminished on the lowlands

which are to be included in the new pumping and drainage district No. 13, which has just been established.

Under the existing local laws and conditions it will be impossible to levee this exposed tract of timber land without Government help. The timber is being rapidly cut off, leaving a rich soil unprotected from the river. The river bank is much higher in many places than the land upon which the present levee is located, and consequently would not require so high a levee.

If the Government will construct this 4 miles of levee or will materially assist in its construction it can be done and the river channel greatly benefited by it. Therefore we bring this matter to the attention of the Mississippi River Commission and ask that it be given a favorable consideration.

Very respectfully,

JAMES Q. BEATTY,
Fruitland, Iowa.

File 1926-24-1.

FRUITLAND, IOWA, November 12, 1913.

To the MISSISSIPPI RIVER COMMISSION,
St. Louis, Mo.

GENTLEMEN: There is a general expression of regret in Muscatine city and on Muscatine Island that the public did not understand the nature of your visit to Muscatine; but it was the impression that the few who had been personally notified of your coming should meet you. Consequently no one was prepared to give you the information in writing, which it is now realized should have been prepared for you and which the boards of county supervisors had agreed to do. If it is not too late I will send you something relative to Muscatine Island.

Muscatine Island is a low, level truck-farming section, possessing a soil that give the highest flavor to all produce raised upon it. It lies south of the city of Muscatine Iowa, along the western bank of the Mississippi River. Its western boundary is the Muscatine Slough, which left the Mississippi River at the city of Muscatine and then returned to the river at a point just above the mouth of the Iowa River, thus cutting off this section into an island about 20 miles long and 5 miles wide in its greatest breadth. It lies partly in Muscatine County and partly in Louisa County, Iowa.

About four-fifths of it is protected from overflow by high water from the Mississippi River by a levee, extending from the city of Muscatine to a point above Port Louisa where a cross levee, called the Hoffman Levee, connects it with the high bluff. All of the land protected by these two levees is called "The Muscatine and Louisa Levee District." It is outlined on the map, which I herewith inclose, with a broad blue line. This district comprises about 24,000 acres. It is largely a fine truck-farming section.

Along the Muscatine slough, and on the lower unprotected portion of Muscatine Island, there are many acres of low, swampy lands, mostly of a rich black soil. These have been used for native meadow, pasture, and timber lands.

The river bank levee is about 15 miles long and was built in 1883 by a public tax on the lands protected. It was not connected with the high bluff and was a failure. In 1893 the short Hoffman levee connecting the river bank levee with the bluff was built by private subscription. In order to keep this levee up a small district was established, known as the "Hoffman levee district," and shown on the map with the broad red line.

The pumping and drainage idea began spreading along the Mississippi River, and then the land speculators bought up the unprotected part of Muscatine Island below Port Louisa, and most of the low lands along the Muscatine slough within the levee district. Then they attempted to make the land on all of Muscatine Island, which would not be benefited at all, help to pay for the redeeming and pumping of the swamp lands. The land speculators' petition to the county supervisors of Muscatine and Louisa Counties, who have the lawful management of levee matters, in favor of this project numbered 35 names, all but two nonresidents. The remonstrance was signed by 265 landowners, almost entirely residents of Muscatine Island in the levee district. But the county supervisors granted the petition of the speculators and prepared to establish the new pumping and drainage district, which will most likely comprise the lands within the crossed blue line on the map. This was such a flagrant outrage that the people took the case into the courts. It was decided for the people in the district court, and then reversed and given to the speculators in the Supreme Court. The people have asked for a rehearing. How it will end is uncertain.

The people have wanted good levees and have willingly been assessed for the upkeep, when it was right and just. But the supervisors have continually neglected our levee until it is in a dangerous condition when the Mississippi shall reach high water with the wind in the east.

We have always felt it was just as right for the Government to take the care of that levee off of our hands as it is for the Government to build and take care of the levee at Oakville and other points along the Mississippi River. But we know now that our levee needs to be raised to a safe height about the high water line, and the bank in some places saved by riprap. And we know that we do need some help from Government to do this properly.

I am also sending you a photo view of the "Muscatine Island dry weather exhibit," at the Muscatine farm festival, held in September, 1913. It speaks for itself. Any land which can make such an exhibit in such an extremely dry year deserves Government aid and protection. Muscantine Island generally ships from 300 to 400 cars of melons annually and raises about 2,000 acres of sweet potatoes, besides other farm truck, fruits, dairying, and some live stock farming.

Hoping this may not reach you too late to be of service, I remain,
Yours, respectfully,

ALICE WALTON BEATTY
(Mrs. James Q. Beatty).
Fruitland, Iowa.

File 1926-25.

RESOLUTION.

Whereas the county of Muscatine, State of Iowa, has heretofore, to wit, in the year of our Lord 1883, constructed a levee commencing at a point at the intersection of the Muscatine Slough with the Mississippi River in section 2, T. 76, R. 2 W. of the fifth principal meridian, and extending southerly along the west bank of the Mississippi River for a distance of about 6 miles to the Muscatine-Louisa County line; and Whereas said levee and the extension thereof into Louisa County cost approximately \$30,000 and has been an anual expense to the land owners in said district; and Whereas said levee has given protection against the overflow of the Mississippi River to approximately 20,000 acres of fertile land, now divided into small farms under high cultivation, and lying between the Mississippi River and the river bluffs immediately to the west of the Muscatine Slough, which originally was a part of the Mississippi River; and Whereas through a system of wing dams the channel of the Mississippi River has been narrowed and so changed as to be a greater burden to said levee; and Whereas said levee has become worn, dilapidated, and unsafe in many places and unequal to the task of withholding the high waters of the Mississippi; and Whereas the cost and expense of repairing and maintaining said levee has become too great a burden for the landowners and taxpayers within the said levee district to bear: Therefore be it
Resolved by the board of supervisors of Muscatine County, Iowa, That the Mississippi River Commission be requested and urged to make immediate repairs to said levee; and that a copy of these resolutions be presented to said commission.

J. W. FLATER,
Chairman of Board of Supervisors of Muscatine County, Iowa.
X. GROSJEAN,
Levee Commissioner of Louisa County, State of Iowa.

ile 1926-26.

MUSCATINE, IOWA, November 10, 1913.

o: The president of the Mississippi River Commission.
om: C. T. Spickler, commissioner of Drury drainage district, Rock Island County, Ill.
As commissioner of Drury drainage district, I would call your attention to the fact at the Drury drainage district has built about 9 miles of levee on the Illinois side the Mississippi River, about opposite Muscatine, extending from a point called Currys Landing to the mouth of Copperas Creek, reclaiming 5,300 acres of land. At the upper end of this district the United States Government has built winged dams extending from the Iowa shore and deflecting the current to the Illinois shore, and this is washing away the levee along this shore. Should there be a break in this levee would not only be disastrous to the property owners in this district, but it would affect the navigation of the Mississippi River at this point, for should the river break through the levee it would find an outlet and channel in what is known as Birth slough, which was once a part of the river and is still a channel running from Currys Landing to near the mouth of Copperas Creek and is now used as the main ch for the drainage district. The levee along this shore should be protected by rapping, and I believe that the Government should do this work. I ask you to investigate the matter and give it your careful consideration.

Yours, respectfully,

C. T. SPICKLER.

File 1926-27.

From: John J. Seerley,
Representing: Flint Creek, Iowa, river levee district.

GENTLEMEN: At the request of the boards of supervisors of Des Moines and Louisa Counties and of quite a number of the citizens of this and adjoining counties, I desire to submit, in the manner requested by you, some of the reasons why we believe we are justified in asking your honorable commission to report in favor of certain work to be done in this community on the levees of the Mississippi River:

1. When the Government built the levee from Burlington to Oakville the work, as we understand, was never completed; i. e., the levee from a point opposite Oquawka north was to be widened 2 feet from top to bottom. This work therefore has never been completed by the Government. This is proven by two facts. The levee north of this point is 2 feet narrower at the top, sides, and bottom than the remainder of the levee south. The party in charge for the Government placed four large iron pipes in section 3, Huron Township, to be used in widening the levee. Three of these pipes were taken to lengthen the three pipes then in Huron slough and one for Gates Lake. For some reason the work was never done and consequently this portion of the levee is much weaker and has on several occasions been in danger by the high water.

2. We also wish to call your attention to the fact that this portion of the levee by reason of being at or near the junction of the Iowa and Mississippi Rivers is in more danger than any other portion of the levee. In fact, last spring it required the service of many men working day and night to protect the levee near Oakville from breaking.

3. Behind the Government levee from Burlington to Oakville there are practically 44,000 acres now in a high state of cultivation. These property owners have expended on repairing of the levee about \$30,000, and yearly now are levying an assessment of 10 mills for the purpose of keeping up repairs. Nevertheless, the report of the engineer Mr. Harman, who made the survey and which is given you for your perusal, shows there is great danger at quite a number of places of the river cutting into the levee; some action is not speedily taken. We believe it the duty of the Government to aid in caring for this levee so as to protect the lives and property of the people located between the river and the bluff.

4. We are aware that there has been considerable difference of opinion as to what kind of work should be done by the Government along the Mississippi River. But it seems to us that this question is no longer a question worthy of dispute. The protection of life and property of its citizens along the great river is as much a government purpose as the making of a 6-foot channel for navigation. The Government should aid the States and counties and people living along this river in taking care of the great floods which almost annually destroy so much property and so many lives.

Again, we do not see any reason why the Government should pursue a different system in caring for the river in the North and in the South. We think the Government should protect the upper portion of the river with levees, etc., the same as being done yearly in the South.

5. Especially along this portion of the river we think the Government has somewhat of an extra duty to perform. It has given the right to a private corporation, with seemingly no restriction, to dam up the river without any regard to the damage which it may cause to people who live adjacent thereto. It is said by the officers of the company that it will back the water in front of Burlington equivalent to 7½ feet at low water, or, in other words, raise the general level of the river 7½ feet at low water. If this be true, what will be the effect upon the Mississippi at this point and farther north during very high water. How much higher the water will be during high water than it would be if this dam was out we do not know but that it will be considerable there can be no doubt. Since the Government without compensation permitted this condition, it seems to us there can be no denial of the justice in saying it should invest sufficient money, not only on the Government levee, but on the levees otherwise built along the river to take care of the increased height of the water that will have to be kept back by these levees hereafter.

6. We desire also to call your attention to the fact that all the deeds for the right of way made to the Government by the property owners contain the provision that it is for the purpose of building and maintaining a levee.

7. And finally, I am requested by quite a number of the citizens to call your commissioners' attention to the following facts:

A few years ago Congress appropriated \$10,000 which was used in making needed repairs along the Government levee. Afterwards \$25,000 was appropriated but only a portion spent for the purpose intended by Congress. Again, the river and harbor bill contained an appropriation of \$25,000 for the work on this levee, but so far not a penny has been spent so far as the people in this community are advised. Why?

Congress made these appropriations and then action been ignored? We do not know but trust your committee may see the necessity for this work, and that the needed work may be done without any more delay.

Respectfully submitted.

JNO. J. SEERLEY.

File 1926-27-1.

FLINT CREEK-IOWA RIVER LEVEES.

To the MISSISSIPPI RIVER COMMISSION,
International Life Building, St. Louis, Mo.

GENTLEMEN: A complete survey, taking cross sections about every 600 feet, was made of the Flint Creek-Iowa River Levee in the early part of the year 1912. The plotted profiles and cross sections of this survey have been delivered to your commission recently in response to a request from your secretary for such information, and copy of such plans, profiles, and surveys as we may have available.

The profiles and cross sections show that for a great part of its length the levee is not up to its established grade and is not full in section. The upper portion of the levee for a distance of several miles was finished with a top width of 4 feet, and the lower portion was finished with a top width of 6 feet. That portion of the levee which lies above Oquawka for the most part is not as heavy, and apparently not as secure against high-water floods as that portion which lies below Oquawka. There are some exceptions to this general statement, because there are some places below Oquawka that are especially weak and below grade.

The levee was designed and constructed to a grade line 3 feet above the high water of 1888 or 1892 (the writer does not remember which of those waters was taken) without reference to the increased height which would be reached by the same volume of flood water flowing in the restricted channel after the levee was constructed. Some apparently creditable statements have been made to the writer that the flood waters have been within 2 feet of the top of the present levee in the vicinity of, and immediately above Oquawka, since the construction of the levee, and when the river stage at Burlington was almost 3 feet lower than during the high water of 1888 or 1892 upon which the design of the grade line of the levee was made.

At a number of places, and for considerable distances, the levee is exposed to waves from storms when the water is over the river banks, and considerable injury has been done to the levee from time to time by wave action.

The river bank near the levee has been eroded, and at a few places the channel has approached very near to the base of the levee. The most dangerous of these places have been protected by rock and brush riprap within the last two years by the United States Army Engineers.

IMPROVEMENTS NEEDED.

The levee apparently needs improvements in the following particulars, viz:
First. Strengthening and raising to a grade line about 3 feet above the maximum flood line of the river, with the water confined to the restricted channel as the levees now built or under process of construction.

Second. Riprapping the levee to protect it from wave action, or the growing of flows in front of the levee wherever that may be found practicable.

Third. The protection of the river shore wherever the current has a tendency to undercut and endanger the levee.

The owners of the lands which are protected from overflow by the construction of a levee have within the last six or seven years constructed main drainage works at a cost of over half a million dollars, and private drainage works, such as tiling and smaller ditches, and other farm improvements of at least an equal amount, so that the property and investment value dependent upon the safety and permanency of this levee come to be of very large proportions, besides a great many farmers are living upon these lands and are dependent upon the protection which this levee will afford.

Respectfully submitted.

HARMAN ENGINEERING CO.,
By JACOB A. HARMAN, *Engineer*.

Harman Engineering Co., engineers, superintendents, managers, civil, mechanical, electrical, Peoria, Ill.)

NOVEMBER 10, 1913.

File 1926-29.

[Statement submitted at Montrose, Iowa, by the mayor.]

MONTROSE, IOWA, November 11, 1913.

MISSISSIPPI RIVER COMMISSION:

The Mississippi River Power Co. having gained its rights in the corporate limits the town of Montrose in an ordinance No. 33 (copy attached), which provides in the seventh paragraph of section 6 that a boat landing or wharf shall be constructed certain sizes and dimensions, and that this area shall be constructed with the earthen fill extending to not less than 2 feet above the new water level. That part of said fill exposed to wave action shall be covered with stone riprap and the surface of the entire remaining traveled area shall be covered with broken stone, etc.

From the fact that stone has been piled along the water front where the shore is not subject to wave action, and the fact that the surface above has been covered with broken stone, we are led to conclude that the Water Power Co. has completed the work.

The water having reached practically the top of this stone or riprap, leaves no provision for the additional rise of 3 feet or better that is to come later on.

Rings are needed in the wharf for the convenience of boats.

Riprap that will not injure boats in making their landings is needed.

[Seventh paragraph, section 6, ordinance No. 33.]

A boat landing or wharf extending approximately from the northwesterly line of Chestnut Street to the southeasterly line of Main Street shall be constructed by filling in the area north and east of the northeasterly line of the relocated Chicago, Burlington & Quincy Railroad Co. right of way and extending approximately northeasterly to the present track of said railroad company; said area to be raised with an earth fill extending from the estimated new water level to an elevation not less than 2 feet above the water level resulting from the construction, operation and maintenance of the aforesaid dam. That part of said fill exposed to wave action shall be covered with stone riprap and the surface of the entire remaining traveled area shall be covered with broken stone. A good and substantial driveway shall be constructed lengthwise of said boat landing or wharf connecting with and extending from Chestnut Street to Main Street.

File 1926-30.

[Copy of paper handed in at Keokuk, Iowa, by Mr. J. P. Dickson.]

To the MISSISSIPPI RIVER COMMISSION.

GENTLEMEN: Understanding that you wish to discuss river and levee matters with the citizens of Keokuk, I suggest that these matters be first outlined about as follows:

First. Navigation as affected by levees or ditches, including levees on tributary territory.

Second. Landings as affected by all factors having to do with the general and special drainage.

Third. Access to landings as affected by city, county, State, or national highway.

Fourth. The river as affected by loose methods of highway and farm engineering and management.

Fifth. Levees as affected by other levees, by flood ways between States, and detritus and debris under State control.

Sixth. River commerce as affected by floods, by levees, by drainage, by flood ways, by dams, by floodgates, and by locks.

Seventh. Acreage value of river products as affected by deep waterways engineering.

Eighth. River supervision as affected by jurisdiction over power sites, over branch intrastate drainage, or levee districts.

Ninth. River improvement as properly being parapsse with true road, farm, and railway reclamation.

Tenth. River maintenance as affected by irrigation projects, pumps, dams, etc.

Eleventh. River population as affected by safe sites for residence, factory, and farm purposes.

Twelfth. River bridges, fords, and ferries as affected by all factors of true reclamation and development.

Thirteenth. River flood planes as affected by dams, levees, cut-offs, diversions, flood reservoirs, or basins and litter, etc.

Fourteenth. River and levee seep waters as affecting agricultural lands, city planning, and natural lawmaking or diplomacy.

- Fifteenth. River soils as affecting levee construction, projection, and management.
 Sixteenth. Levee profiles and cross-sections as related to land profiles and to river velocities.
 Seventeenth. River velocities as affected by levees, dredging, underdrainage, vertical drainage, soil absorption, evaporation, transpiration, farm storage devices, irrigation, drouth, and forests.
 Eighteenth. River cross-sections and stages as affected by railroad embankments, bridge approaches, levees across flood planes, and city planning.
 Nineteenth. River records as guides to planning.
 Twentieth. River topography as favoring ditching even as much as leveeing, as favoring cut-offs and intercepting tiles or diversion tiles, and natural rather than personal or political district ideas.
 Twenty-first. River and levee interests as opposed to compromise plans and plats, and grab and graft figuring of costs, etc.
 Respectfully.

J. P. DICKSON.

file 1926-31.

WARSAW, ILL., November 10, 1913.

MISSISSIPPI RIVER COMMISSION.

St. Louis, Mo.

GENTLEMEN: In compliance with the request contained in your letter addressed to Mr. Joe Fry, Warsaw, Ill., the commissioners of the Hunt drainage district beg to submit the following matters in connection with said district:
 The Hunt drainage district is organized under the laws of the State of Illinois, and comprises lands between Warsaw, Ill., and the south line of Hancock County, Ill., the Mississippi River on the west, and the slopes of the bluffs on the east, and contains, approximately, 15,400 acres.
 The levee is situated on the western boundary of the district near the Mississippi River, and is about 12 miles in length. This levee connects with that of the Lima Lake drainage district. The lands comprising the Lima Lake drainage district are situated in Adams County, Ill., and the levee of this district is about 10 miles long, being 6 miles on the river front and 4 miles from the river front to the bluffs. The average height of the levee of the Hunt drainage district is about 9 feet and the average width at the base about 50 feet. The material of which it is made varies from pure sand to a heavy black soil, but the most of the levee is made of a sandy soil.
 The Hunt drainage district levee was built in 1880 and that of the Lima Lake drainage district in 1888. Since the construction of our levee it has been improved as much as was possible, taking into consideration the funds at the disposal of the commissioners for that purpose. The amount which can be levied any one year as a "repair tax" in the Hunt drainage district is limited to 22 cents per acre. This sum has been used for the purpose of maintaining and repairing the levee. The amount levied by this repair tax has not been sufficient to maintain and repair the levee, and in 1894 the Government enlarged and repaired it at an expenditure of \$25,000. Again in 1896 the Government expended on the levee the sum of \$5,000. In 1903 it became necessary to have funds to repair the levee, and a special assessment was levied on the lands within the district amounting to \$8,500. And again in 1905 an assessment for like purpose was made, amounting to \$9,300. These four sums, totaling \$47,800, have been used as indicated, and in addition to this the annual repair tax collected has been used for that purpose since the construction of the levee has amounted to about \$100,000, making almost \$100,000 that has been used in maintaining and repairing the levee.
 Since the construction of our levee it has broken thirteen times. These breaks range from 400 to 1,000 feet in length, and in many cases ruined the lands near the break occurred, both by washing deep holes or ditches across the same by depositing thereon large quantities of sand. Of course, at these times other lands in the district farther from the break were overflowed, crops lost, and in some cases buildings carried away. These breaks occurred at the following times and places, to-wit: In June, 1880, on section 29, 3 miles south of Warsaw; In October, 1880, there were four breaks, one at station 217, 5 miles south of Warsaw; one at station 72, 8 miles south of Warsaw; one at station 406, 9 miles south of Warsaw, and one at station 464, 10 miles south of Warsaw; in May, 1888, three breaks, one at station 150, 3½ miles south of Warsaw; one at station 150, 3½ miles south of Warsaw, and one at station 45, 1 mile south of Warsaw; June, 1892, one break at station 538, 12 miles south of Warsaw; April, 1897, one break at station 296, 7 miles south of Warsaw; June 3, 1903, there were three breaks, one at station 315, 7½ miles south of Warsaw, one at

station 505, 11 miles south of Warsaw, and one at station 615, 13 miles south of Warsaw. The stations referred to are 100 feet apart, beginning at the north end of the levee.

There have been several periods of high water since the last break occurred in the levee. At these times the commissioners have been able to keep the levee from breaking by carefully patrolling the same during the entire period of high water both night and day, and protecting all weak places with sacks of sand and other reinforcements. This has been found to be a very expensive way of protecting the levee. We desire to say here that we have never been able to hold our levee when the river stood at a 19-foot stage at Keokuk, Iowa, lasting for one week.

The mouth of the Des Moines River is a few miles above our levee, and when there is a high stage of water in the Mississippi and a sudden rise in the Des Moines our levee is in great danger and it is almost impossible to hold it.

The lower end of our levee is 497 feet above sea level, which is about 2 feet lower than it ought to be, and for about 6 miles, beginning at the south end and running north, it should be raised in height for at least 2 feet and should be strengthened and broadened. In 1903 the water came to within a foot of the top of the levee at the south end, causing it to break. We estimate that the cost of putting our entire levee in first-class condition, so as to fully protect the lands of the district is approximately \$50,000. The average value of the land in the district is about \$60 per acre. In 1868 an assessment on the lands of the district was made for the sum of \$75,000, or about \$5 per acre. This assessment was to pay bonds issued by the district payable 10 years after date in ten equal annual installments. Six of these annual payments have been made, leaving four payments to be made.

Before the construction of our levee there were a number of sloughs or watercourses connecting with the river and running through the district. When there was high water in the river it would flow into and through these sloughs or watercourses with sufficient force to remove all deposits of every kind in these sloughs or watercourses and keep them open. During this period of time the natural drainage of the lands of the district was into these sloughs or watercourses. After the construction of the levee, the same having been built so as to prevent the water from the river flowing into these sloughs or watercourses, they have filled with debris of all kinds with the result that the lands of the district can no longer drain naturally through these watercourses, and artificial ditches and watercourses have been constructed. This has been a great expense to the district and has been paid for by the landowners.

What has heretofore been done, however, by the landowners of the district in the matter of draining the lands of the district has not been sufficient, and the commissioners are now contemplating the expenditure of more than \$40,000 for the purpose of draining the lands of the district by removing the deposits and obstructions from the natural watercourses in the district, and constructing artificial ditches there. To do this, it will be necessary to levy an additional special assessment on the lands within the district for that purpose.

The commissioners desire to call particular attention of the commission to the fact that the levee of the Hunt drainage district is very much in need of enlargement and repair in order to protect the lands within the district. As heretofore said, the south 6 miles of the levee of the Hunt drainage district is not of sufficient height and should be raised at least 2 feet, and broadened and strengthened as well. There are two places where the levee is exposed to the waves of the Mississippi River during a high stage of water. One of these places begins at the lower end of what is called Taylor Island (about 8 miles south of Warsaw) and continues south a distance of about $2\frac{1}{2}$ miles to the south end of what is known as and called Buzzard Island. The other place begins at the head of what is known as and called Hackley Island and continues south a distance of about one-quarter of a mile. At both of these places the levee is unprotected from the river, and during times of high water in the river the waves strike this levee with such force that it is in danger of being washed away. The part of the levee so exposed is very much in need of riprap.

The repair tax heretofore referred to is not sufficient to enlarge, raise and repair the levee as it should be. Taking into consideration the indebtedness of the district at the present time, as above referred to, the need of drainage within the district and the repairs and work necessary to be done, it will be seen that the burden is much for the landowners to carry. Unless some assistance can be obtained from the Government, the work which ought to be done on the levee and referred to above will be left undone, with the probable result that breaks will hereafter occur and the lands of the district become overflowed and damaged materially.

We, therefore, urge upon the commission that it investigate the condition of the levee referred to and especially the south 6 miles thereof and the parts exposed to the river, and if consistent with the act under which the commission is making investigation, recommend to the proper authorities that the Government assist

landowners of the district by raising, enlarging, and strengthening the south 6 miles of the levee and by riprapping or otherwise protecting that part of it which is exposed to the waves of the river. If the Government will assist the landowners in this way they will be able to provide for the drainage within the district and for repairs that may be necessary to the levee hereafter.

Respectfully submitted.

JOE FRY,
W. C. VAN PAPPELENDAM,
R. B. JOHNSON,

Commissioners of the Hunt Drainage District, Hancock County, Ill.

File 1926-32.

[Board of commissioners of Indian Grave drainage district, Adams County, Ill.]

QUINCY, ILL., November 11, 1913.

To MISSISSIPPI RIVER COMMISSION,
Sitting at Quincy, Ill.

GENTLEMEN: The Indian Grave drainage district is a public levee and drainage district corporation organized under an order of the county court of Adams County, Ill., on January 26, 1880, in pursuance of the statutes of the State of Illinois, and embraces about 17,500 acres on the west side of Adams County north of Quincy, being lands situated in townships 1 and 2 north and 1 south, in range 9 west.

Its boundaries as established by said order were the proposed levee line on the west and north and the east bluffs of the Mississippi River on the east and southeast.

The levees of the district begin near the northwest corner of section 35 in township 2 north, range 9 west, and run thence west near the north line of sections 35, 34, 33, and 32 about 3 miles to a point near the center of the north line of said section 32 and thence run in a southerly and southeasterly direction along the east shore of the Mississippi River about 12 miles to a point in section 27 in township 1 south, range 9 west, near the center of the north line thereof, and thence in a northerly and easterly direction about 1 mile to the east bluffs of the Mississippi River near the west line of section 14 in township 1 south, range 9 west, about a quarter of a mile north of the south line thereof. These levees are generally referred to as in three sections, namely, the North Cross Levee, the South Cross Levee, and the River Line Levee.

There has been expended in the construction and maintenance of the levees of the district the special assessments which have from time to time been levied upon the lands of the district, aggregating approximately \$210,300, and also the entire annual repair tax of the district from the time of its organization, which has been and is limited by the order of court in the organization of the district to approximately \$1,500 per annum.

The lands of the district are generally low bottom lands and can not be naturally drained during seasons of high water in the Mississippi River and are imperfectly and inadequately drained at any time. Many large creeks and water courses flow into the district, and these have their sources in the bluffs and highlands lying east of the district and drain an area of approximately 100,000 acres, and during certain seasons of the year great quantities of rain, surface water, creek water, and seep water fall upon and flow into the district.

Therefore the reclamation of the lands of the district requires an adequate system of drainage embracing pumping plants, as well as the system of levees, and this need and requirement occasions the outlay of approximately \$300,000 for installation of pumps and will require about \$5,000 annually for pumping purposes alone.

The levees of the district were originally constructed at an elevation of 1 foot above the high-water mark of 1851, with the approved slope on both sides. In the course of years, the levees have shrunk and settled and have been damaged and depleted by the wash of the high waters of the Mississippi River. The district by the expenditure of considerable sums has been able to keep the levees to their original height approximately and has strengthened the levees by strong slabs and bents on the inside, but it has been unable even by the expenditure of much money to resist or even cope with the action of the river in its washing and wearing away of the river-line levee. In seasons of high water a strong current of water in that arm of the river known as East Chute is directed with terrific force against the outside of the river levee and this current, assisted by strong winds from the northwest dashes the water in great waves against the levee, has caused a large portion of the levee to be washed away and has so encroached upon it that it has become hazardous and dangerous to life and property within the district.

Many years ago the Mississippi River Commission, recognizing the danger to the levee of this action of the high water, expended something in the neighborhood of \$40,000 to riprapping that portion of the levee most exposed to this wash. That work has been the means of saving the levee from a break up to this time, but the riprapping has gradually sunk and slipped down toward the bed of the chute until now the top 6 or 7 feet of the levee is exposed to the action of waves and current, and unless something is done to deflect the current or resist its action the river-line levee can not withstand more than two more seasons of flood waters.

There is the greatest necessity for the deflection of the current in East Chute from the levee or the riprapping of the outer slope of the levee, and if the construction of proposed levees on the west side of the river raise the stage of the water in the river then the levee must be raised and strengthened.

But the immediate and urgent need of the Indian Grave drainage district is for riprapping along the levee for about 2 miles where the waters coming in through Smoot Chute are directed most strongly against it. This is that portion of the levee which lies in sections 28 and 33 in township 1 north, range 9 west. This work is too great and too expensive to be borne by the lands of the district and must be done by Federal aid if the lands are to be preserved for agricultural purposes.

Your petitioners therefore respectfully petition and request the Mississippi River Commission to give this matter your immediate attention and at as early a time as practicable to take such steps and do such work as will prevent the encroachment of the river upon the improvements and lands of the district.

Respectfully submitted.

D. H. GRAHAM,
WM. A. GRIESER,
HENRY VAHLE,

Commissioners of the Indian Grave Drainage District.

By JOHN T. INGRAM,
Their Attorney.

File 1926-33.

LIMA LAKE DRAINAGE DISTRICT,
Quincy, Ill., November 11, 1913.

TO MISSISSIPPI RIVER COMMISSION, Quincy, Ill.

GENTLEMEN: The Lima Lake drainage district is a public levee and drainage district corporation organized under an order of the county court of Adams County, Ill., on July 2, 1885, in pursuance of the statutes of the State of Illinois, and embracing 13,476 acres in the northwest corner of Adams County, being lands situated in Township 2 north and ranges 9 and 10 west.

Its boundaries as established by said order were the north line of Adams County to the north; the east bluffs of the Mississippi River on the east; the Indian Grave drainage district on the south, and the Mississippi River on the west.

The levees of the district begin on the north line of Adams County about a quarter of a mile west of the northeast corner of said township 2 north, range 10 west, and run thence in a generally southerly and southwesterly direction along the east shore of the Mississippi River about 5 miles, and from thence eastwardly through the southern portions of sections 30, 29, 28, 27 and 26 in said township 2 north, range 10 west about $4\frac{1}{2}$ miles to the east bluffs of the Mississippi River. These levees are generally referred to as in two sections, namely, the River Line Levee and the South Cross Levee.

There has been expended in the construction and maintenance of the levees of the district the several special assessments which have from time to time been levied upon the lands of the district, aggregating approximately \$130,000, and also the entire annual repair tax of the district from the time of its organization, which has been and is limited by the order of court in the organization of the district to approximately \$2,500 per annum.

The reclamation of the lands of this district requires a system of drainage and pumping improvements as much as a system of levees. The watershed which furnishes the water, which under present conditions flows into and falls upon the lands of this district, contains approximately 64,000 acres; and this great amount of water necessitates an outlay for pumping purposes alone of from \$4,000 to \$5,000 annually, depending upon the rainfall, and also the installation expense of the proper ditches, drains, and pumping plants.

The levees of the district were originally built at an elevation of 1 foot above the high-water mark of 1851; that in the course of years the levees have shrunk and settled to such an extent and have become so depleted and damaged by the erosion

the high waters of the Mississippi River in times of flood that they are not now of sufficient height and strength to resist the high waters of the Mississippi River, and that their present condition is now hazardous and dangerous to the safety of human life, live stock, crops, and other property within the district. That in 1903, during the high water of that year, the river levee of this district, and as well the Hunt district on the north, were broken and the lands were entirely overflowed, all crops destroyed, and on account of this break and overflow the waters poured over the south cross levee of the district and cut the height and slope of such levee to a dangerous point.

The immediate and urgent need of the Lima Lake drainage district is the raising and strengthening of the levees of the district and the riprapping of the river line levee at the points and locations where it is exposed to the erosion of the Mississippi River. This work is too great to be borne by the lands of the district alone and should receive liberal Federal aid.

And your petitioners respectfully petition and request the aid and assistance of your honorable commission in this behalf at as early a date as is practicable.

Respectfully submitted.

J. H. BEST,
JOHN ENSMINGER,
JAMES BRAGG,

Commissioners of the Lima Lake Drainage District.

By JOHN T. INGRAM,
Their Attorney.

[Statement submitted by Fabius River Drainage District.]

file 1926—34.

to the MISSISSIPPI RIVER COMMISSION:

Your petitioner, Fabius River Drainage District, respectfully represents that it is a drainage district under Article I of chapter 41, Revised Statutes of Missouri, 1909, organized and existing by virtue of a decree of the circuit court of Marion County, Mo., made at its February term, 1911, said decree having been confirmed by the Supreme Court of Missouri on February 9, 1913. (See *In re Fabius River Drainage District v. Ott*, 240 Mo., 31.)

The said district was formed for the purpose of reclaiming and protecting from overflow for agricultural and sanitary purposes a large body of about 11,181 acres of swamp and overflow lands in Marion County, Mo., bordering on the Mississippi River and lying immediately opposite the city of Quincy, in the State of Illinois, said lands being both swampy and subject to overflow from the Mississippi and North and South Fabius Rivers and largely unproductive but susceptible of being reclaimed and rendered fertile and productive if protected from overflow and adequately afforded drainage.

The said district is bounded on the north by the north line of Marion County, Mo., on the east by the Mississippi River, on the south by a line about one-half mile south of the South Fabius River, and on the west by the west bluffs or hills of the Mississippi. It is approximately 5 miles wide east and west and 4 miles long north and south, with a frontage of about 5 miles on the Mississippi River.

The North Fabius River, having a drainage area of about 1,000 square miles, enters the district near its northwest corner, and follows a tortuous course eastward to its junction with the South Fabius River, about one-half mile from the Mississippi River. The South Fabius River, having a drainage area of about 600 square miles, emerges from the bluffs and enters the district about 3 miles south of the entrance of the North Fabius River and follows a tortuous course eastward through the district to its junction with the North Fabius River.

A plan for reclamation adopted by the district, in addition to affording internal drainage for all the lands by means of main channels, lateral ditches, and a \$40,000 riprap plant, it is proposed to turn the North Fabius River south along the west boundary of the district near the bluffs and join it to the South Fabius River where it emerges from the bluffs, and to straighten the latter river by cutting off the numerous bends and curves but leaving its entrance into the Mississippi River as at present; also to construct a levee on the four sides of the district, in length about 15 miles. This levee will be necessary to protect the lands within the district against overflow from the Mississippi River on the north and east, the Mississippi and Fabius Rivers on the south, and the North Fabius River on the west.

The estimated cost of the work of constructing the new channels for the Fabius River and the levees, exclusive of the internal drainage work (estimated at about \$25 per acre), is about \$25 per acre for all the land in the district. This large cost is

due in a great measure to the necessity of taking care of the Fabius Rivers, which are quite important tributaries to the Mississippi River and in times of flood carry an immense volume of water, and to the need of exceeding strong and high levees to protect against the floods of the Mississippi River; especially is this true for that part of the levee along the Mississippi River from the south line of the district to the Marion County line and along the Marion County line west to the bluffs.

The Fabius River Drainage District therefore represents that it is in need of Federal aid in the proposed work of taking care of the flood waters of the Fabius Rivers by means of said new channels and levees and in the construction and protection of the proposed levees along the bank of the Mississippi River from the south line of the district to the north line of Marion County, and thence west to the bluffs.

Wherefore your petitioner prays this honorable commission for such allotment of moneys or other assistance as in their judgment would be meet and fitting in aiding said district to accomplish its purposed work.

Dated at Quincy, Ill., November 11, 1913.

FABIUS RIVER DRAINAGE DISTRICT,
By JOHN A. DEARING, *President*.
J. H. BEST, *Secretary*.

[Information regarding the Des Moines and Mississippi Levee District No. 1, situated at junction of the Des Moines and Mississippi Rivers, in Clark County, Mo.]

File 1926—35.

LENGTH.

This system of levees is 17 miles in length, protecting about 11,000 acres of land from overflow of the Des Moines, Mississippi, and Fox Rivers, in Clark County, Mo.

HEIGHT AND WIDTH.

The levee is approximately 6 feet high, but is necessarily much higher in places than at other points, ranging, in fact, from 3 to 30 feet high, the extremes being shown at distances only.

The width is generally 5 feet across the top, with side slopes of 2 to 1, making base 29 feet across, and at points where levee is over 6 feet high or under that height the base is in proportion. Banquettes were not built and were not used in the construction of this system of levees.

DATA AND COST.

Prior to the organization of this district by special act of the Legislature of Missouri in 1855 a levee district, known as the Egyptian Levee Co., embracing the same territory as this district, was organized. The Egyptian Levee Co. made a system of levees on practically the same route and ground as the present system, but owing to inadequate laws and lack of ability to raise funds the system was a failure; however, they built a low, small levee on about the same ground as the present one.

The present district, organized in December, 1903, has used the old company's levee and erected a greater and stronger levee on it, also excavating 7 miles of drainage ditches to carry off surface water. The cost of improvements to the present district has been \$117,000, and we still need improvements badly.

ACREAGE AND VALUE OF LANDS IN DISTRICT.

The value of lands in this district varies according to location, the cheapest being worth about \$15 per acre; the best located land and that commanding highest price being worth \$125 per acre, the general average of value being \$82 per acre. A total value of all lands in the district being about \$900,000.

ESTIMATE OF COST TO MAKE LEVEE STANDARD IN FIVE YEARS.

The 9 miles of Des Moines River levee should be strengthened and made 2 feet higher. A part of this system is through sand, where it is very difficult to make a levee stand. Dikes are necessary along river front to prevent erosion and current striking levee and washing it away.

The front of this levee should be protected by riprap or dikes at short distances. The cost of this protection would be about \$2,000 per mile. Nine miles requiring \$18,000, this amount expended within five years would be sufficient.

The Mississippi River levee is 2 miles in length, all of which is exposed to the river and will need to be built higher, wider, and stronger, as well as to be protected by a willow mattress or stone riprap, so as to prevent current from destroying the levee. The present levee is up to height of usual high water in the Mississippi River, and should be 3 feet higher, with side slopes of 2 to 1 and base in proportion. After levee is built to full height it will have to be protected from cutting on river front by riprap of stone or willow mattress with stone to sink same. To strengthen this 2 miles of levee on Mississippi River it will cost \$2,000 per mile, and to erect and build the protecting riprap of stone or willows it will cost \$5,000 per mile, or a total cost of \$14,000 for this 2 miles of levee. The remaining 6 miles of levee is along the Fox River on south side of district and only needs to be strengthened at points where it is weak.

The cost of this would be about \$1,000 per mile, or a total of \$6,000. The total cost of bringing this entire system of levees up to standard will be \$38,000, and until this is done the whole system is endangered.

REVTMENT NECESSARY.

Along the Des Moines River for several miles we have erected dikes in the river to deflect the current so that it will not run straight against the levee. These dikes do a great deal of good, but are not sufficient in number or size and at many places the bank of levee is still unprotected. The protection necessary, a riprap of stone alone or willow mattress with stone, along the Des Moines River where it endangers the levee will cost \$10,000 for this 9 miles of Des Moines River levees.

The Mississippi River levee for 2 miles is exposed to the current of the river and should be protected by riprap either of willows and stone or stone alone. The Fox River levee will not need protection of this character.

The amount of revetment necessary in five years on the Mississippi River levee would be \$10,000, and the total amount of revetment necessary for the district would be \$20,000.

COST, HISTORY, AND FINANCIAL CONDITION.

The lands of this district were by special act of the Legislature of Missouri, organized into a levee company (Egyptian Levee Co.) in 1855. A system of small levees were built to protect from overflow from the three rivers, Des Moines on the north, Mississippi on the east and Fox River on the south. Owing to failure of the officers under inadequate laws to raise funds necessary to build levees high enough and to make necessary drainage ditches the landowners in 1903 reorganized under the general levee and drainage laws of Missouri under the name of Des Moines and Mississippi levee district No. 1. The original assessment of benefits for improvements was \$5,000, but owing to unprecedented flood of Des Moines River washing about \$5,000 north of levee and the mistake of a civil engineer in estimating the cost of improvements, the district necessarily expended over \$100,000 in completing the necessary improvements. And by reason of an inadequate outlet for one of the drainage ditches it was necessary to spend \$15,000 more to carry the immense amount of surface water coming into and falling in the district out of the district, so that improvements to date have cost \$117,000. The present officers of the district are W. E. Bates, president of the board of supervisors, I. B. Kerr, secretary, both of Alexandria, Mo.; and Samuel Hammond, D. W. Harter, Alexandria, Mo., and H. I. Sawyer, Keokuk, Iowa, members of the board of supervisors; C. T. Llewellyn, Kahoka, Mo., attorney for district. The district has a bonded debt of \$12,500, bearing 6 per cent interest. The annual tax levy necessary to pay interest, keep up repairs, current expenses, etc., is from \$20 to \$1.80 per acre, depending upon location of land and its assessed benefits. There are three creeks or large branches flowing into the district from the west. They carry an immense amount of water from a large watershed of higher land on the west of the district, down into the district and this water, together with that from rain and melting snow in the district, at times floods many acres of the best land in the district.

THE LEVEES, KIND OF MATERIAL, HEIGHT, ETC.

The levees are largely of black, sandy loam, the soil usually found on bottom lands of creeks and rivers, alluvial or made soil, but in places it is sand and in other places it is gumbo.

In places the levees are wholly of sand, and these are often necessarily higher than other places.

A large part of the lands of this district are on a bottom over and across which the Des Moines River has run in the past, many years ago, and the underground strata of earth is streaked with sand, frequently as wide as 100 yards and from 1 to 15 feet deep. The levees were frequently broken by flood up to 1903, and again in 1905 by an unprecedented flood, but we have had no breaks since then.

The height of levee necessary to protect the lands is about 8 feet, and the present levee should be 2 feet higher than it is. Height of Mississippi River levee necessary to maintain with reference to Government gauge is ———.

This district has never received Government aid of any character.

EXTENSION NEEDED.

Owing to there being three large creeks, branches, or watercourses flowing into the district from the west and draining a watershed of 10,000 acres of hill land not in the district an extension of additional drainage ditch is very badly needed to divert the water of all three of these streams and carry it into Fox River before it reaches the district.

This drainage ditch would not be in the district, but would run north and south a mile and a half west of the district.

This ditch would have to be 3 miles long, about 40 feet wide, and 6 feet deep, which would cost for right of way, excavating, etc., \$20,000. This district has never asked or received Government aid heretofore.

File 1926-35-1.

To the MISSISSIPPI RIVER COMMISSION:

The Des Moines and Mississippi River district No. 1, of Clark County, Mo., respectfully asks for an allotment of a portion of the appropriation made by the last Congress of the United States in aid of levees north of Cape Girardeau, Mo., and for that purpose furnish your commission with the full statement of facts.

LOCATION AND SITUATION.

The Des Moines and Mississippi River district No. 1 is situated at confluence of the Des Moines and Mississippi Rivers in Clark County, Mo., and extends west about 9 miles.

LENGTH.

This system of levees is 17 miles in length, protecting about 11,000 acres of land from overflow of the Des Moines and Mississippi and Fox Rivers in Clark County, Mo.

HEIGHT AND WIDTH.

The levee is approximately 6 feet high, but is necessarily much higher in places than at other points, ranging in fact from 3 to 30 feet high, the extremes being at short distances only. The width is generally 5 feet across at top, with side slopes of 2 to 1, making base 29 feet across, and at points where levees are over 6 feet high and under that high the base is in proportion. Banquettes were not built and were not used in the construction of this system of levees.

SIZE, ACREAGE, AND POPULATION.

The district embraces approximately 11,000 acres of land; the population of the district is between 1,800 and 2,000, including the old town of Alexandria, with 700 people. The value of lands in the district ranges from \$15 to \$125 per acre, and the general average value of land in the district per acre is \$82, the total value of all land in the district being about \$900,000.

COST, HISTORY, AND FINANCIAL CONDITION.

By special act of the Legislature of Missouri in 1855, a levee district was organized in the territory of this district, and by amendments to the act from time to time levee was built on the site of the present levee about 4 feet high, some drainage ditches were made, some dikes erected, and other improvements, none of which, however, were adequate and did not prevent overflow and destruction of crops in the territory. The present district was organized by decree of the circuit court

Clark County, Mo., in December, 1903, for the purpose of erecting a greater and stronger levee, making large drainage ditches and affording a better protection to the lands of the district. Improvements made by the first or old levee company cost about \$200,000, and proved to be insufficient to protect against the overflow of rivers, and to carry off the surface water with drainage ditches. The present organization has spent \$117,000 in strengthening the levees, making them larger and stronger, making other deeper and larger drainage ditches, and building more dikes in the Des Moines River to deflect a current of that stream, so that the total cost of improvements of the district is approximately \$317,000. The bonded debts of the present district is \$12,500. In addition to this we have outstanding indebtedness of about \$47,000, evidenced by warrants issued by the board of supervisors and judgments of courts establishing an indebtedness against the district. Up to the year 1903 the district suffered frequently with overflows, and in that year a very destructive overflow washed away a great deal of the levee, and an unprecedented overflow of 1905 took out some \$6,000 worth of embankment and wrought ruin in the district; since then we have had no overflows. The height of the levee is not sufficient to adequately protect the lands of the district, as the levee should be 2 feet higher. The dikes in the Des Moines River are not sufficient in numbers or size to protect the levee along the Des Moines River. About 9 miles of the levee system is along the Des Moines, and about 2 miles along the Mississippi River. This 2 miles along the Mississippi River is not high enough by 2 feet, and is menaced by the current of the Mississippi River, and more especially so since in 1913 the United States Government erected jetties on the Illinois side of the river opposite Alexandria in the interest of navigation and which deflect the current and turn it toward the Missouri shore, thereby greatly endangering the levees at that point. Before this was done, in April, 1912, during a high water, the levee just south of Alexandria came dangerously near breaking by reason of the waves eating away the levee near the top, and we were only saved an overflow and break of the levee by the voluntary act of the Chicago, Burlington & Quincy Railroad Co. in providing hundreds of grain boards, taken out of cars used for the shipment of grain, and with their section force laying these grain boards along the top of the levee for 150 yards. Through the persistent efforts of the section crew in working and watching this stretch of levee it was prevented from breaking and the district saved an overflow.

We especially complain of the action of the United States Government in the erection of jetties on the Illinois side of the river thereby deflecting the current to the Missouri shore and across our system of levees at Alexandria, Mo., where it will do very serious injury to our system of levees.

A large part of the lands of this district are on a bottom over and across which the Des Moines River has run in the past, many years ago, and the underground strata of earth is streaked with sand, frequently as wide as 100 yards and from 1 to 15 feet deep. It is with difficulty that a levee can be made to stand on such soil, and necessarily must be wide and strong in order to do so. Our levees are built mainly of black sandy loam and gumbo, with stretches of pure sand.

The present officers of the district are W. S. Bates, president of the board of supervisors, and I. B. Kerr, secretary, both of Alexandria, Mo.; Samuel Hammond and W. Harter, Alexandria, Mo.; and H. I. Sawyer, Keokuk, Iowa, members of the board of supervisors; C. T. Llewellyn, Kahoka, Mo., attorney for district.

NEEDS OF THE DISTRICT.

By referring to the map of our district heretofore filed with your commission it will be seen that that point of the district extending farthest east, being the town of Alexandria, Mo., is exposed to the current of the Mississippi River, and we have 2 miles of levee along the Mississippi River, all of which is exposed to the current of the river and not high enough by 2 feet to protect us from overflow, and by reason of the character of the soil should be protected by riprap or willow mattress. The town of Alexandria is a dangerous part that we must seriously consider. Along the Des Moines River we need more dikes to deflect the current away from the bank and protect the bank and the levee. We already have dikes along here, but they are insufficient in number and inadequate in size to be a sufficient protection.

ESTIMATE OF NEEDS.

The 9 miles of Des Moines levee should be strengthened and made 2 feet higher. Dikes are necessary along the river front to prevent erosions and current striking levees and washing them away. The number of dikes along the Des Moines should be doubled. The front of this levee should be protected by riprap or dikes at short

distances. The cost of this protection would be about \$2,000 per mile, or a total cost of \$18,000, to protect the 9 miles of levee along the Des Moines River. The Mississippi River levee is 2 miles in length, all of which is exposed to the river and will need to be built higher, wider, and stronger, and to be protected by a willow mattress or stone riprap, so as to prevent currents from destroying the levee. This Mississippi River levee should be 3 feet higher, with side slopes of 2 to 1 and base in proportion. It should then be protected by riprap of stone or willow mattresses, with stone to sink same. To strengthen this 2 miles of levee on the Mississippi River it will cost \$2,000 per mile, and to erect and build the protection of riprap of stone or willow it will cost \$5,000 a mile, or a total of \$14,000 for these 2 miles of levee. The remaining 6 miles of levee is along the Fox River on the south side of the district and only needs to be strengthened at points where it is weak. The cost of this would be about \$1,000 per mile, or a total of \$6,000.

In conclusion we respectfully ask for a due consideration of our needs and a fair and impartial allotment in proportion to our needs, and we shall be glad to furnish any other or further information to your commission that you may require.

Respectfully submitted.

W. E. BATES,
President Board of Supervisors.
I. B. KERR, Secretary.
C. T. LLEWELLYN,
Attorney for District.

STATEMENT OF HENDERSON COUNTY DRAINAGE DISTRICT NO. 3.

File 1926-28.

OQUAWKA, ILL., November 10, 1913.

To the MISSISSIPPI RIVER COMMISSION,
United States Army.

GENTLEMEN: We respectfully request you to examine into the feasibility and practicability of recommending the improvement and protection of the east shore line of the Mississippi River beginning at the village of Oquawka and continuing south along the east bank of the Mississippi River for such a distance as your honorable body may deem it wise and necessary to protect the property adjacent thereto and render the channel at such place navigable and useful. We beg leave to submit herewith map marked "Exhibit No. 1" showing the territory sought to be protected in drainage district No. 3, of Henderson County, Ill., and also a map marked "Exhibit No. 2," to show the location of the requested protection and improvement beginning at the village of Oquawka and continuing south along the east bank as you may determine necessary to prevent the further encroachment of the river upon the property and also to further improve the channel in this vicinity. All the above is respectfully submitted for your consideration, for the following reasons:

1. That heretofore there have been constructed in the Mississippi River immediately north and across the river wing dams and shore protection in such manner as to cause the channel of the river to be thrown against the place in question and has destroyed former work done by the Government, and if some improvement or protection is not done in the immediate future the waters of the Mississippi River will not only further encroach upon the lands lying along the east bank of the river, but will entirely destroy all of the revetment and shore-protection work heretofore done by the Government and will wash through the low-lying lands and sloughs immediately south of the particular place and will cause a channel to be cut down through and over a large section of the fertile farming lands and render same entirely unfit for cultivation and, in addition, the changing of the channel in this particular place, from our own observation, will cause bars to be formed in the river that will be a menace to navigation within the near future.

We understand that it has been the policy of the Government to encourage the protection and improvement of lands adjacent to the river where the same can be done without interference to navigation, and for this reason your attention is called to this particular apparent injury that will likely fall both to navigation and to adjacent property if some proper and necessary means are not taken by you to remedy this encroachment upon the shore line, which has progressed with alarming rapidity in recent years.

2. We further suggest that we are the commissioners of a drainage district now engaged in the improvement of the lands shown on Exhibit No. 1, and have organized a drainage and levee district for this purpose; that after giving a careful examination

tion to the particular locality we find that the danger at this point is almost certain to be one to navigation as well as to the property contained in this district.

We have arrived at the foregoing conclusions after having our attention called to the matter by an engineer who is familiar with this work. We therefore pray that you recommend such improvement as you may deem necessary for the benefit of all interests involved.

Respectfully submitted.

MARTIN WALTER,
R. B. PARSONS,
JOHN OBERLY,

Commissioners of Drainage District No. 3, Henderson County, Ill.

[A brief in a hearing before the Mississippi River Commission, presented on behalf of the board of commissioners of the Sny Island levee drainage district of Adams, Pike, and Calhoun Counties, Ill.]

File 1926-16-1.

ON BOARD THE STEAMER "MISSISSIPPI,"

November 11, 1913.

The SECRETARY MISSISSIPPI RIVER COMMISSION,

No. 1311 International Life Building, St. Louis, Mo.

GENTLEMEN: I beg to invite your attention to the act of Congress approved March 4, 1913 (p. 19 of H. R. 28180), which says:

"The Mississippi River Commission shall make an examination of the Mississippi River from Cape Girardeau, Missouri, to Rock Island, Illinois, with a view to such improvement as will at the same time promote navigation, develop water power, and protect property adjacent to said river from damage by floods; and in making such examination consideration shall be given and recommendations made as to plans for cooperation by the localities affected; and for the purposes of such examination and for the building of such levees between said points upon the river in aid of navigation, as may be found necessary or desirable by the commission and approved by the Chief of Engineers, the sum of \$200,000 is hereby appropriated."

First. I understand the meaning of said act to be: Make plans and estimates of cost to promote navigation and protect property adjacent to said river from damage by floods.

To do either effectively the river must be retained within its banks. That may not be done without stable river banks supplemented by levees of sufficient height and cross section to withstand the highest known waters.

I believe that the United States minimum standard levee cross section for conditions similar to Sny Levee, is an 8-foot crown at a grade line 3 feet above the maximum high waters, and with slopes of 2 to 1 and 3 to 1. When the material is not of the best that cross section should be enlarged.

From high-water data collected from official sources (see my letter and the tables accompanying the same on Sept. 24), I am led to believe that the 1892 high water at stations not affected by levees constructed since 1851 was not as high as the 1851 high water by 2.13 feet.

From that evidence I believe the grade line for an 8-foot crown should be not less than 5 feet above the flood plane of 1892 high water adjacent to the Sny Levee. It is also quite probable that there should be from 1 to 2 feet added to the 5 feet as a safety factor because of the levee building and the extensive internal drainage development along the watershed of the river above our levee.

For the purpose of discussion only and with no desire to forestall any estimates to be made by you, allow me to state that nearly a year ago I made an approximate estimate to enlarge said levee from its present condition to the suggested standard United States cross section, using river side slope of 3 to 1 where protected by a foreshore of timber, and a 4 to 1 slope where exposed to wave action. It shows that 2,000,000 cubic yards will be required, which, at a total cost of 25 cents per cubic yard, will cost \$500,000. To protect the river bank and exposed portions of the levee with riprap, which will require 220,000 square yards at \$1, will cost \$220,000. Total of \$720,000.

Second. I believe that the wording of said act is elastic enough to mean that any residue of said \$200,000 after paying the expenses of said survey and examination will be immediately available for use to promote navigation and protect property adjacent to said river from damage by floods, and for the building of such levees between said points, etc. In view of such belief permit me to invite your attention to Mississippi River chart No. L23 in the vicinity of Hamburg Bay; also to a map of Mississippi River and Hamburg Bay in the vicinity of Mozier's Island made in 1903 by direction of Maj. J. L. Lusk. Corps of Engineers, United States

Army. I believe the former shows that the portion of the river between the lower end of Sny Levee and Hamburg is more tortuous and unstable than any other portion of the river adjacent to Sny Levee. I grant that the conditions since the chart was made may have been improved. I however believe that the extension of Sny Levee southerly about 2 miles or to what is known as Piling Chute would be a material aid in confining the river within its banks, thereby benefiting navigation.

It would also reduce the flood plane of the various stages of backwater behind the levee about 1 foot, which means a protection to 3,000 to 4,000 acres of land from overflow from the various stages of high water.

To extend said levee about 2 miles would require approximately—

163,046 cubic yards, at 20 cents per cubic yard.....	\$32, 609. 20
Timber clearing and grubbing.....	4, 000. 00
	36, 609. 20
For engineering and contingencies, 10 per cent.....	3, 660. 92
	40, 270. 12

If the levee may be so located that the work may be done by a floating dredge the cost may be reduced.

It is with some mental reservations that I ask permission to invite your attention to the extension of said levee across islands Nos. 475, 476, and to near the lower end of No. 477, a total of about 6,100 feet. I have no doubt of its being beneficial to navigation and to the property adjacent to the river, but the cost, approximately \$50,000, may make it prohibitive for the present.

By direction of the board of commissioners:

Respectfully submitted.

E. J. CHAMBERLAIN,
Engineer Sny Island Levee Drainage District.

[Statement submitted by J. W. McNeal.]

File 1926-10-1.

TULSA, OKLA., October 20, 1913.

PRESIDENT MISSISSIPPI RIVER COMMISSION,
Room 1322, International Life Building, St. Louis, Mo.

MY DEAR SIR: I note in the paper that your commission is to start from Rock Island on November 10, making an inspection of the Mississippi River as far as New Orleans and public hearings shall be heard on the route. I have read that the commission intend commencing at the mouth of the river and working up on a levee system. While I am not an expert on levee work, it does not look to me like this would be either sensible or profitable. I think they should commence somewhere above the mouth of the Missouri in order to get the best results, and the least outlay, and also get the benefit of the current in working on down the river. The great watershed of the Ohio and Missouri will be the great problem. The leveeing of the valley on either side of the Mississippi, from its headwaters down as far as the Missouri River, is a comparatively economical proposition, and would prove conclusively the benefit of the leveeing system that would reclaim thousands and thousands of valley land that is now of very uncertain value. I would love to be with you on the trip, but am too busy a man to start on a trip of this kind. I am interested in some property above the mouth of the Missouri River, and may have a little selfishness in writing you this letter, but I believe that the proposition ought to appeal to every reasoning person that the way to get the results is to work above the mouths of the Missouri and Ohio Rivers. At some time, I hope to see an ocean route from Lake Michigan down through the Mississippi and to all the markets of the world, and believe it is only a question of a few years until this project will be successfully followed out. We know the sewer from Chicago now runs into the Illinois River. This proves that it is very easy to divert the waters of the Great Lakes that now are carried into the Atlantic Ocean down into the Mississippi, and into the Gulf of Mexico, making St. Louis the greatest inland city in the United States, if not in the world.

Yours, respectfully,

J. W. McNEAL.

File 1926-10-3.

[U. S. Department of Agriculture. Office of Experiment Stations. Drainage investigations. Report of a preliminary examination of West Alton levee district, No. 1, St. Charles County, Mo., to the engineer in charge of drainage investigations, by W. J. Schlick, assistant drainage engineer. Field examination made Dec. 16 and 17, 1912. Report submitted Jan. 11, 1913.]

INTRODUCTION.

Levee district No. 1, St. Charles County, Mo., was organized in May, 1911. The purpose of the organization was to construct levees to protect the bottom lands from Mississippi River overflow. A survey was made and plans for the work were prepared by Mr. Alfred Riske, of St. Charles, Mo., in May, 1912. These plans were rejected by the landowners, owing to doubt as to the feasibility of the proposed work. Later, two new locations for the levee were proposed, either of which would protect nearly double the area to be protected under the original plan.

In November, 1912, W. J. Schlick, assistant drainage engineer, Office of Experiment Stations, United States Department of Agriculture, was requested by Mr. Ben Mennemeier, president of the board of directors of the original district, and Mr. George Logan, attorney for that district, to make an examination of the original district, the plans for its protection, and of the territory to be included in the proposed enlarged districts.

On December 16 and 17, 1912, Mr. Schlick visited the district and made the examination in company with Mr. Mennemeier and other interested landowners. The routes proposed for the levees of both the original and enlarged districts were gone over, and the character of the soil, the measures for river bank protection, and the instances of recent bank erosion were noted. All parts of the territory which it was proposed to protect were visited, the natural surface conditions were noted, and information as to the amounts, kind, and value of the crops raised and the value of the land was obtained.

The accompanying sketch map was prepared from a small map of the district made by Alfred Riske, and some additional data obtained on the examination sketched on it. The map shows the main physical features of the district, the routes for the proposed levees, and the route followed in making the examination. The locations shown for the proposed levees are intended only to indicate the general routes, but are not intended as recommendations as to the exact locations.

GEOGRAPHICAL LOCATION AND AREA.

The territory that would be protected by the proposed levee lies along the south bank of the Mississippi River, in St. Charles County, Mo., and is directly across the river from Alton, Ill., and to the north of West Alton, Mo. The lands are situated in the neck between the Mississippi and Missouri Rivers, about 12 miles above the junction of those streams. The original district lies on the mainland between the Chicago, Burlington & Quincy and the Missouri & Illinois Bridge & Belt Railways, and has a river ridge as its general boundary on the southwest. (See accompanying sketch map.) The proposed enlarged districts have the same locations, except that they extend to a great deal farther west and include McPikes and Dresser Islands.

The original district embraces an area of about 2,500 acres, of which about 2,000 acres are subject to overflow. The proposed enlarged districts will each contain about 4,500 acres, of which 3,500 to 4,000 acres are subject to overflow.

The railways forming the south and southeast boundaries of the district afford ready communication with Alton and St. Louis. The St. Louis-to-Kansas City trains of the Missouri, Kansas & Texas Railway enter St. Louis over the Burlington tracks, and thus afford access to the district from Kansas City and the West. West Alton is a regular station on each of the roads. The district can also be reached from Alton by means of the ferry.

NATURAL SURFACE CONDITIONS.

The general slope of all the mainland included in both the original and the proposed enlarged districts is to the north. This, however, is not universal because of the irregular-shaped ridges that lie within the district. The natural surface in all but a few places at the edge of the higher ridges has a very gradual slope or is practically level.

It may be said of Dresser Island that in general all of the river front is high, and the general slope is toward Brickhouse Slough. Both the upper and lower ends of the island are low.

The conditions on McPikes Island are very similar to those on Dresser Island, except that the upper end of this island is unusually low. Since the construction of

the railway embankment across the island, the upper end of the latter has been built upstream for about one-fourth of a mile. All of this latter addition is very low and wet. This filling in has also been aided by the loose rock "wing dikes" which were built to maintain the deep channel next to the rock bluff on the Illinois side. The maintaining of the main low-water channel on the Illinois side has caused both Brickhouse Slough and the slough between McPikes Island and the mainland to become filled in, especially at the outer ends.

Owing to these "wing dikes" there has been only a very little bank erosion on the Missouri side. Some evidences of this action were seen on the outside of Dresser Island and on the mainland between the two islands where the main channel swings to the Missouri side. This section of the mainland, however, is protected by rock riprap from ordinary or low-water erosion. At a few places instances were seen where the upper bank, above the level of the "wing dikes" and the riprap, had been cut back 25 to 30 feet for distances of from 100 to 300 feet.

In the original district about 2,000 acres were subject to overflow, while in the enlarged districts this overflowed area is increased to about twice that amount. In general it may be said that all that land marked on the map as "high" is free from damage from overflow, though the line of the overflow will not coincide exactly with the indicated limits of the high ridges. The lower ridges and the bench lands are subject to damage from only the higher of the ordinary overflows, while all the remainder, both mainland and islands, is overflowed at each high water.

The soil of all this area, both mainland and islands, is an alluvium which has been deposited by overflow. The top soil, varying in depth from 1 to 8 feet or 10 feet, is a close black loam, locally termed "gumbo." This top soil along the lines of the proposed levees will average about 5 feet in depth, the maximum and minimum depths noted being 10 feet and 3 feet, respectively. However, on only a very small proportion of the distance traversed in the examination was the depth of top soil noticed to be less than 5 feet, and usually it was nearer 8 feet.

All of the mainland is under cultivation, except a narrow tract along the slough next to the islands and in and around Strongs Lake. The amount now uncleared probably amounts to not more than 5 per cent of the total area. The greater part of Dresser Island is under cultivation, only the lower parts still remaining in timber. Brickhouse Slough, McPikes Island, and the slough next to it are all in natural timber principally willows.

The principal crops of this section are wheat and corn. Truck crops, such as potatoes and onions, are occasionally attempted on the higher land, but the probability of loss from overflow discourages most owners from attempting a crop of which the cost of cultivation is as great as in the case of the so-called truck crops. The average yields, when not damaged by overflow, is about 50 bushels of corn and 25 bushels of wheat to the acre. It was stated that the crops, where they were not damaged by overflow, had an average yearly value of at least \$15 to the acre, and often more than this.

The average value of the land within the district is about \$75 an acre. The price ranges from about \$50 an acre for the lower land, where the overflows are frequent, to \$100 or \$125 an acre for the higher land, which is rarely or never overflowed.

DRAINAGE CONDITIONS.

Floods.—The highest flood stage on the Mississippi River at St. Louis of which the United States Weather Bureau gives any record was that of June 28, 1844, when the river would have registered 41.4 feet on the present gauge. The next highest stage was reached on June 10, 1903, when the present gauge registered 38 feet. Other high stages were 36.7 feet on May 19, 1892, 35.5 feet on June 26, 1883, and 35.25 feet on July 16, 1909.

The flood stages at St. Louis are influenced to a great extent by the Missouri River. Of the total drainage area above the junction of the two streams, the Missouri drains 76 per cent. As the mouth of the Missouri is only about $6\frac{1}{2}$ miles below Alton, the flood stages of the Mississippi at that place are controlled to a considerable extent by the stage of the Missouri, so that the stage at Alton may not be as high at all times as would be indicated by the stage at St. Louis. It was stated by old residents that the serious overflows at West Alton occurred when the St. Louis gauge registered a stage of 31 feet or over; but, for the reasons just stated, this must be taken as only a general statement.

In Appendix 1 are shown the dates, heights, and durations of all Mississippi River floods at St. Louis since 1872, where the stage of 31 feet was reached. The data for the years 1872 to 1897 were taken from Bulletin E, issued by the United States Weather Bureau in 1897. In this bulletin all those periods during which the river was above the danger line are given, but the gauge reading which corresponds to the danger line

was not stated. However, from data given it seems that this danger line corresponded to a reading of between 30 and 31 feet. Inasmuch as these data are here of value only in showing the periods during which the West Alton district has suffered from overflow, the records of all these periods were placed in the column headed "Gage read 31 feet or over." It is possible that the danger line to which these periods refer correspond to a gauge reading of 30 feet instead of 31 feet, but this would not change the duration of the overflow periods enough to make any material difference in this study. The data for the floods subsequent to 1898 were taken from the records of the daily gauge readings published by the Mississippi River Commission.

Appendix II shows the maximum readings on the St. Louis, Mo., Alton, Ill., and Grafton, Ill., gauges on the Mississippi River, and for the St. Charles, Mo., gauge on the Missouri River, since 1898. The data for only those years when the St. Louis gauge read 31 feet or over are given; they were taken from the records of the daily gauge readings as published by the Mississippi River Commission.

The distances of these Mississippi River gauges above Cairo, Ill., at the mouth of the Ohio River, are: St. Louis gauge, 190.8 miles; Alton gauge 216.2 miles, and Grafton gauge 233 miles. The St. Charles gauge is approximately 19 miles above a point opposite West Alton.

The elevation above the mean Gulf datum of the zero of the St. Louis gauge is 379.79 feet, of the Alton gage is 313.54 feet, of the Grafton gauge 403.66 feet, and of the St. Charles gauge 413.53 feet.

From Appendix I it is seen that since 1844 (68 years) there has been one flood which reached a stage of 38 feet at St. Louis. It is also seen that there have been five floods which reached a stage of 35 feet during the same period, or approximately one every 14 years, but that three of those five floods occurred from 1904 to 1909, or one every two years. However, the factors which determine the stage to which any particular flood will go are too variable to allow of any great reliance on prophecies of future floods based upon such meager data on past floods as are given here. The records are interesting, though, as showing the seasons of the year during which floods have occurred, and during which, therefore, future floods may be expected. Assuming that the West Alton district was suffering from serious overflow during all the time when the St. Louis gauge registered a stage of 31 feet or over, it is seen that since 1872 the district has been overflowed for a total of 175 days. This 175 days is distributed over four months, there being a total of 9 days in April, 48 days in May, 38 days in June, and 60 days in July. All of these months, especially May, June, and July, are what are termed "growing" months, when an overflow of any considerable duration would greatly damage or wholly destroy the crops on the lands inundated.

It was stated by residents near West Alton that the flood of 1903 was 3 feet higher than that of 1898. This would have given a reading on the Alton gauge of 114.6 feet, which is equivalent to an elevation of 428.1 feet above mean Gulf datum. The actual elevation of the Missouri River flood at St. Charles in 1903 was 413.5 plus 34 or 447.5 feet above mean Gulf datum. This section of the Missouri has a surface slope during high stages of approximately 0.81 foot per mile. This would cause a fall of 19 by 0.81 or 15.4 feet from St. Charles to a point opposite West Alton, giving the elevation of the 1903 Missouri flood at West Alton as 447.5 less 15.4 or 432.1 feet. This seems to indicate that in 1903 the Missouri flood was 4 feet higher than the Mississippi flood. This seeming difference in elevation is probably slightly greater than the actual difference, owing to the fact that the crest of the floods on the two streams did not reach West Alton on the same day. The Missouri flood broke over the Burlington tracks and flowed across the district to the Mississippi. That this flood flowed across the district with considerable velocity is evidenced by the fact that a considerable quantity of sand was deposited on the flat lands at the north end of Schmeltzer Lake at this time. Since this flood the Burlington tracks have been raised to a height above that reached by the flood, so that it is not probable that the district will suffer from any future Missouri floods.

It will be noticed from Appendix II that the readings on the Alton gauge vary more nearly with those on the St. Louis gauge than do those on the Grafton gauge. This is due to the fact that the Missouri River floods back up the Mississippi, so as to affect the stage at Alton, but do not affect the Mississippi as far up as Grafton.

Natural drainage channels.—There are no well-defined drainage channels within the district, though Brickhouse Slough and Schmeltzer, Spatter Dock, and Strongs Lakes offer opportunities for collecting and storing the surface run-off. Brickhouse Slough, lying between Dresser Island and the mainland, is an old overflow channel. It has an average depth of from 12 to 14 feet in the central portion, though the ends have been filled up to a considerable extent. The average top width is from 300 to 400 feet, and the sides are gradually sloping. Schmeltzer and Spatter Dock Lakes lie in the western portion of the district. Probably these are also old overflow channels.

made by the Missouri River. These lakes, especially Schmeltzer Lake, lie between or at the foot of high ridges. Their bottoms are probably 15 feet, and possibly as much as 20 feet, below the surrounding land. They are very narrow, being not over 400 feet wide at the widest place. Strongs Lake is situated in the eastern part of the district and has its outlet into a slough between McPikes Island and the mainland. This lake probably is also an old overflow channel, but it differs from the others mentioned in that it has very gradually sloping banks and is surrounded by a low flat swamp.

All of this area is afforded excellent underdrainage by the sandy subsoil. This is shown by the fact that the fields are in a good condition for cultivation within 24 to 48 hours after a heavy rain.

The west portion of the district drains to Brickhouse Slough, the most of it directly, though a small territory drains through Schmeltzer and Spatter Dock Lakes. A considerable portion of the eastern part of the district drains through Strongs Lake into the slough between McPikes Island and the mainland. A floodgate under the highway grade has been provided for this drainage. In case the district is enlarged, Brickhouse Slough and Strongs Lake will provide storage for the surface run-off during times when the floodgates must be closed on account of high stages of the Mississippi.

EARLY LEVEE WORK.

Some levee work has already been constructed in this section. The old Smith Levee (see map) was constructed in 1885, and still furnishes some protection to the lands lying between it and the railroad against the lower of the Mississippi overflows.

South of the Missouri & Illinois Bridge & Belt Railway the Big Wise Levee (see map) has been constructed to protect the lands behind it from the Mississippi overflow, which backs up below the railway embankment. This levee was built to the same height as the railway embankment, the latter protecting the inclosed lands from overflow from the north.

IMPROVEMENTS REQUIRED.

It does not seem advisable at this time for this district to attempt any improvements other than levees along the Mississippi water front, as the Burlington embankment furnishes very good protection against the Missouri floods. It may be that at some future date it will be advisable for the district either to enter into an agreement with the railway company to raise their embankment or to construct an independent levee. This, however, should not be attempted until after the Mississippi River levee has been built. Three locations for this Mississippi River levee have been suggested. (See map.)

First. Starting on the mainland at the Missouri and Illinois Bridge and Belt Railway tracks and following the mainland upstream to a point above midway on Dresser Island, thence turning south to the ridge.

Second. Starting at the same point and following the same line to the lower end of Dresser Island, thence around the outer edge of the island to the ridge on the mainland, either at a point directly south of the extreme upper end of the island or else west a short distance, and thence south to the ridge.

Third. Starting at the railway tracks at the outer edge of McPikes Island and following the river front along the outer edge of the two islands to the upper end of Dresser Island, and thence to the ridge, as in the second scheme. (This location is not shown on the map.)

The first location mentioned is that recommended and staked out by Mr. Riske. His location is very good, except that it seems to be a little too close to the bank of the slough along McPikes Island and along Brickhouse Slough to allow the dirt for the construction of the levee to be taken from the river side of the latter.

The second location mentioned has several advantages over the first. It would protect nearly double the amount of land protected by the first scheme, while it would be only about one-third longer. The land along the outer edge of Dresser Island is as high as and probably slightly higher than the mainland along Brickhouse Slough. The mainland at the upper end of Dresser Island is high next to the river bank, so that it is probable that the levee could be carried upstream on this high bank for a short distance and then south to the ridge more cheaply than it could be built directly south to the ridge from the upper end of the island. However, this point should be determined from the data collected by a good survey. This location has the added advantage of leaving Brickhouse Slough within the district, to serve as a reservoir during the times when the Mississippi is at a high stage. This slough would also intercept any seepage which might come through the sandy subsoil of Dresser Island.

The third location has several advantages over either of the others, but it also has some objectionable features which, judging from the data at hand, seems to outweigh in importance the advantages. The levee would be approximately of the same length as that in the second location and would protect the added area of McPikes Island. This location would leave the slough along the land side of the island, to serve as additional storage reservoir. The capacity of this slough for storage purposes is small, however, as the filling in of late years has decreased the depth to such an extent that any great amount of storage in the slough would cause quite an area on the island to be flooded. The main disadvantages of this scheme is the increased height of levee which would be necessary. The highest part of the island is at the river front on the south end, and even this is probably from 2 to 4 feet lower than the mainland. This levee would necessarily have to be built across the newly made land at the upper end of the island, and this is especially low. It is also probable that on this newly made land the top soil, of which the levee should be constructed, is not as yet very deep. This location should not be rejected entirely, however, until further investigations and surveys have been made. Before any plan is definitely decided on, the proposed locations of the levee should be carefully examined and borings made to determine subsurface conditions, and when there is any question concerning the foundation test pits should be sunk.

It is seen from the foregoing discussion that, judging from the data at hand, the second location for the levee is the most advantageous. This location, and the approximate boundaries of the resulting levee district, are shown on the accompanying sketch map. Of all the plans proposed it seems that this levee would protect the land at the least cost per acre.

The height to which this levee should be built is determined to some extent by the height of the Missouri and Illinois bridge and Belt Railway embankment. Inasmuch as this embankment is to be used to complete the system it would be useless to build the levee proper to protect against a higher stage than that which will be held by the railway embankment. That portion of the embankment between the end of the Big Wise levee and the end of the district's levee will have to be depended upon to hold the flood waters from backing up onto the district. The Big Wise levee has already been constructed to a height equal to that of the railway embankment.

The levee, as planned for the original levee district No. 1, was to have a height of 7 feet above the crest of the 1908 overflow and 0.3 feet below that of the 1903 flood. This height is approximately that of the railway embankment. If the flood stages at Alton are assumed to vary the same as those at St. Louis (and the data in Appendix seem to indicate that this is so), this height of levee would have held all floods since 1872, and possibly since 1844, except that of 1903. The flood of 1892 would have stood within 1 foot of the top, but it is probable that even this could have been held if the levee had been maintained in proper shape. It is thus seen that the levee planned probably would have been overtopped but once in 41 years, and possibly only once in 68 years. As any raising of the railway tracks probably would be very costly on account of the nearness of this portion of the tracks to the Mississippi River edge, it seems that the recommended height for this levee is finally determined. It is possible that the stages at Alton have not all been indicated by those at St. Louis, in such a case it might be found desirable to raise the height of the levee above that mentioned, though this is not probable.

The levee for the original district was to have a 6-foot top and 3 to 1 and $1\frac{1}{2}$ to 1 slopes. As much of this levee will be on the river front it would be advisable to increase this section to a 5-foot top and 3 to 1 slopes on both sides. Besides giving added strength, the flat slopes will permit the growth of a good sod within a short time. The flatter slopes will also furnish a greater protection in case any washing should occur; some erosion from wave action is to be expected, and this might have a serious effect upon a $1\frac{1}{2}$ to 1 slope.

If the levee is built to this section the railway embankment will be the weakest part in the system, and if an agreement can be entered into with the railway company, it would be advisable to strengthen that part of the embankment between the Big Wise levee and the end of the district's levee. This could be done either by increasing the width for the entire height or by building a banquette on the north side. This levee should be constructed entirely of the close, black, loamy top soil. The borrow pit should be on the river side, but in no case should the near edge of the pit be closer than 15 feet to the toe of the levee. This near edge of the borrow pit should be on a flat slope, probably 3 to 1, so that there may be no tendency for the side of the pit to cave back under the toe of the levee. It would also be desirable to limit the width of the near side of the pit to 3 feet and to give the pit bottom a slope of about 7 to 1 away from the levee. This, however, will have to be determined to some extent by the amount of material necessary for the levee and by the depth of the top soil.

As the sandy subsoil will probably be exposed in the pit, it would be well to leave "traverses" or bars of undisturbed ground, 10 to 20 feet in width, every few hundred feet, so that there may be no tendency for a current to be formed through the pit. In constructing the levee across Brickhouse Slough, sheet piling or muck ditch may be needed to cut off the seepage. A muck ditch will probably be advisable whenever the layer of heavy soil is less than 5 feet thick.

Some mention was made by landowners of the possibility of constructing the levee with a floating dipper dredge, it being the idea that this type of machine would afford the most economical construction. Owing to the fact that the water line in the river is about 12 feet below the natural ground surface for most of the year, it is not probable that the water line could be maintained at a sufficient height to allow the working of this type of machine. Either a dry-land "drag-line" type of machine or teams and scrapers will probably be found to offer the most economical method of construction. If the work is done with teams it will be found easier to obtain the ideal conditions as to berm and borrow pit than with any other method.

Owing to the evidences of the bank cutting which are to be seen, especially along the mainland between the two islands and along the outer edge of Dresser Island, the levee should not be located close to the edge of the bank. The value of the land which might be saved by building the levee as close to the bank as construction features would allow would be more than offset by the damage due to one break in the levee.

All of the river front along this district is well protected either by riprap or with dikes against low-water bank erosion. This is not true, however, of the higher stages of the river. After the construction of the levee the bank should be very carefully watched and any bank cutting stopped as soon as noticed. The quarries on the Illinois side yield rock suitable for this work, which is obtainable at a very reasonable price. A rock riprap up the entire slope of the bank could be built at a cost that would be by no means prohibitive, and would furnish ample protection against damage from this source.

Floodgates to care for the flow from Brickhouse Slough, if the Dresser Island location is used, and from Strongs Lake should be provided. These should be of permanent construction and should be so built as to be easily operated. Each of these basins should be used as storage reservoirs for the surface drainage during the times when the river is at a high stage.

SEEPAGE.

One of the principal objections against the building of the original levee was the fear of seepage water. Instances were mentioned of where the water rose to the surface in the low swales and sloughs when the river stood for some time near bank full, and these cases were cited as reasons why the original system was not feasible.

The land in the uncultivated areas, especially if it is wet a greater portion of the year, will be filled with crawfish holes, which offer good channels to the surface of the water in the open sandy subsoil. When these areas are cultivated the number of such holes will be greatly decreased, as crawfish will not work in soil that is frequently disturbed. During extended floods it is to be expected that the land near the levee will be wet, but it is not anticipated that seepage will cause great trouble. The close texture of the top soil will aid greatly in holding back the seepage water. A line of 6-inch drain tile laid at a depth of about 4 feet, about 8 feet from the inside "land side"—toe of the levee should intercept much of the seepage water. Brickhouse Slough and Strongs Lake will furnish good outlets for such tile. This slough and lake will in themselves serve as a means of intercepting a great deal of seepage water, as after the levee is constructed all the seep water must come from the front. Under existing conditions the water in Brickhouse Slough stands at the same height as in the Mississippi River during periods of high water. If it can be held at a level in Brickhouse Slough, this would materially reduce the amount of seepage. During floods of short duration (14 days or less) the damage from seepage should be small. During the longer floods, when the river is above flood stage for 15 days or more, a greater amount of seepage must be expected. Appendix I shows that in the past 38 years there have only been four times when the river was above flood stage more than 14 days, and it is questionable whether a large expenditure to prevent seepage during these periods is justifiable.

MAINTENANCE.

A small pumping plant, located at the lower end of Brickhouse Slough, would be a means of removing both the interior drainage and seepage water during flood stage from practically the entire district, except that portion along the eastern end of Strongs Lake. It is possible that a pumping plant could be located so as to serve

whole district. A plant of sufficient capacity could probably be installed at a cost of not to exceed \$8,000 or \$9,000. The cost of operating such a plant, including interest on the amount invested, depreciation, labor, fuel, and supplies, should never exceed 80 cents per acre for the land protected by the levee. From the data shown in Appendix I, it does not seem probable that a pumping plant would be needed for more than one or two months per year, depending upon the stage of water in the river. A man should be kept at the plant the year round, to insure that it will be ready to run at all times. It is probable that the installation of a pumping plant will not be advisable until such time as truck farming is undertaken to a considerable extent. The value of truck crops is, however, sufficiently high to make the expenditure of the amount necessary for a pumping plant advisable.

No levee, no matter how well planned and constructed, will afford the protection that it should unless it is efficiently maintained. Probably the greatest menace to levees in this section of the country is the burrowing of such animals as muskrats, ground hogs, etc. If a levee is allowed to become covered with a growth of weeds and brush, these animals are almost sure to begin burrowing in it. The muskrat is especially injurious, because of his habits of starting a burrow under or near the water surface and continuing it across the embankment and up to within a foot of the surface.

A system of regular inspection and of making small repairs as soon as any weakness is found will be found to be cheaper and safer than a system of yearly inspection and attempting repairs when the levee is seen to be endangered during some high water. It seems probable that a wagon road will follow this levee for most or all of its length. This road should be built on the natural surface, or on a banquette at the inside toe of the embankment, but not on top as the rutting due to constant travel on top of the levee will lower its effective height. At all places where a wagon road must cross the levee the crossing should be graded up to the level of the top of the levee, with gradual slopes on each side. These crossings should be given especially careful inspection during all high stages of the river. A growth of a good tough sod on the top and on the slopes of the levee are desirable, but in no case should weeds or brush be allowed to grow there. Pasturing is a good means of preventing the growth of weeds and brush, but in this case care must be taken that paths are not worn across the levee. A growth of willows in the burrow pit will furnish a good protection against current and wave erosion, but these should not be allowed to get a start either on the berm or on the level slope. If there should be any portion of the levee along which the current is especially strong, it probably will be advisable to pave the river bed with rock. This rock can be secured at the Alton quarries and delivered in barges at a small cost.

ESTIMATE OF COST.

As much as surveys of only the original district have been made, there are not sufficient data upon which to base an estimate of cost of the proposed extensions. It is probable, though, that the levee will have an average height of about 9 feet, with a maximum height of about 13 feet, exclusive of those sections across Brickhouse Creek.

SURVEYS.

Any survey which is made for this district should gather complete data as to the areas which are actually damaged by overflow and as to the best and cheapest locations for the levee, giving consideration to the lengths and heights required for different locations, the construction features, and the lands benefited. The cost and feasibility of raising the Missouri and Illinois Bridge and Belt Railway tracks should be investigated. In making the survey the actual elevations, referred to the same datum, of the past floods should be obtained as far as is possible. These elevations should form the basis upon which the height of the levee is determined. Every consideration should be given to the needs of interior drainage by means of pumping plants which may later become desirable. There is probably no more unwise form of false economy to which such a district is liable than that of trying to save money by hiring a cheap, incompetent engineer, or of requiring of him that he plan the improvements on the results of an insufficient or incomplete survey. The additional cost due to the securing of good engineering advice will be much less than that of correcting some vital mistake arising from incompetent or insufficient engineering service.

ORGANIZATION.

It is not the purpose of this report to discuss the legal phases of levee district organization. There were, however, some features in the methods of conducting the affairs of the original levee district No. 1 that should be eliminated from all future work. In determining the district boundaries, all of any farm containing overflowed land which would be benefited by the proposed levee was included within the district and was assessed. The rate of the assessment was supposed to equalize this, but it nevertheless was the cause of much opposition to the prosecution of the work. In the original district an attempt was also made to assess the Missouri & Illinois Bridge & B. Railway right of way for a share of the cost of the work. Inasmuch as this embankment was used to form the completing link in the system, it seems hardly fair that it should be assessed for the cost of this work. Before any future work is attempted a reorganization should be made under a law which will provide for a more equitable method of determining the district boundaries and of levying the assessments.

The law under which the original district was organized provided that the salary which the engineer for the district should receive for the time actually employed in any one month should not exceed \$75. This is manifestly unfair both to the district and to the engineer, for to live up to this provision he may be compelled either to slight his work or to receive insufficient remuneration for his services. This should also be corrected in the reorganization.

BENEFITS.

There result from every properly designed and constructed drainage or levee system two general classes of benefits, namely, those which may readily be expressed in terms of dollars and cents and those which, while they may be of great importance, are not readily so expressed. These latter are usually termed "general benefits."

The benefits to crops that will result from the construction of a properly designed levee in this district are fairly definite, and may be expressed in terms of their monetary value. During the past year the average yields of corn and wheat were 50 and 20 bushels an acre, respectively. This crop of corn was readily salable at a price near 50 cents per bushel, while the wheat was sold for a price near \$1 per bushel. The yield and price are both higher, possibly, than those which may be expected every year, though with the proper cultivation this soil should produce this amount every year. It is probably safe to estimate that for every year that a levee holds off a flood it has saved the district \$15 for every acre protected. This, figured on the basis of the larger district, would be 4,000 multiplied by \$15, or \$60,000. In other words the value of one crop saved would nearly or entirely pay for the construction of a levee.

Another benefit of this first class would be the resulting advance in land value. It was stated by men acquainted with this district that the actual market value of those lands which are subject to frequent overflows was not over \$50 an acre, while that those lands which were never or only rarely damaged by overflows were valued at from \$100 to \$125 an acre. The construction of the levee would make these lower and cheaper lands nearly as valuable as the higher lands, which would mean an advance of \$50 an acre. Assuming that the average value of all the land within the district is not over \$75 an acre, and this is probably not far wrong, the completion of this levee system should add an average of \$25 to the value of each acre of land within the district.

The general benefits to the district which will result from the construction of proper flood-protection works are too numerous and too varied to allow of full discussion here. Some of these benefits, however, should be mentioned. The construction of this levee will enable the farmer to plan his crops so as to yield him the largest possible returns, instead of planning them so that his loss, in case of an overflow, will be the least, as is now the case. It will allow the construction of better levees and their maintenance in better condition. It will enable the farmer to get to his trading point, either West Alton or Alton, Ill., by means of the ferry at all times. It will benefit the health conditions, in that it will decrease the liability of the occurrence of those diseases which have their indirect origin in the swampy, wet condition of overflowed land, and in the shallow, stagnant pools. It will make possible a more uninterrupted operation of the public schools. These are only a few of the "general benefits," but they serve to show the importance of this class of advances resulting from the construction of flood-prevention works.

CONCLUSION.

It has been the purpose to give in this report a discussion of all the factors which will determine whether or not the proposed work is feasible, and then to draw such conclusions as seemed warranted, and to make recommendations which, if followed, will insure a good system of levee protection. It is to be regretted that there was not more data at hand as to the elevations, both of the recent floods and the natural surface. In making these recommendations consideration has been given to the requirements of a good levee system rather than to those of a cheaper one, in which efficiency would be sacrificed to reduce the cost. It is believed, however, that if these recommendations are followed out ample protection can be secured at a reasonable cost.

APPENDIX I.—*Dates, heights, and durations of Mississippi River floods at St. Louis, Mo., where stage reached 31 feet, 1872–1912, inclusive.*

Year.	Highest reading.		Gauge read 31 feet or over.		
	Feet.	Date.	From—	To—	Number of days
6.....	32.7	May 10	May 9	May 14	6
1.....	34.3	May 6	Apr. 27	May 8	12
2.....	33.1	July 5	July 2	July 10	9
3.....	35.5	June 26	June 17	July 3	17
2.....	36.7	May 19	May 12	June 16	36
2.....	31.8	July 9	July 4	July 15	12
3.....	32.3	May 3	May 1	May 5	5
7.....	31.7	May 2	May 1	May 5	5
3.....	38.0	June 10	June 3	June 18	16
4.....	33.6	Apr. 29	Apr. 26	May 4	9
8.....	34.95	June 20	June 13	July 20	38
9.....	35.25	July 16	July 12	July 21	10
Total.....					175

NOTE.—The flood of June 28, 1844, would have registered a stage of 41.4 feet on the present gauge.

APPENDIX II.—*Maximum river stages and dates at points named during floods in which a stage of 31 feet was reached at St. Louis, 1898–1912, inclusive.*

Station.	Period during which St. Louis gauge read 31 feet or over.	Highest reading during year.	Date of highest reading.
St. Louis, Mo.....	None, 1898–1902.	1903.	
St. Louis, Mo.....	June 3–18 (16 days).....	38.0	June 10
St. Louis, Mo.....		(1)	
St. Louis, Mo.....		28.7	June 11
St. Louis, Mo.....	Apr. 26–May 4 (9 days).....	34.0	June 9
St. Louis, Mo.....		1904.	
St. Louis, Mo.....		33.6	Apr. 29
St. Louis, Mo.....		110.9	Do.
St. Louis, Mo.....	None, 1905–1907.	24.0	Apr. 30
St. Louis, Mo.....		29.1	Apr. 29
St. Louis, Mo.....		1908.	
St. Louis, Mo.....		34.95	June 20
St. Louis, Mo.....	June 13–July 20 (38 days).....	111.6	June 19
St. Louis, Mo.....		23.8	Do.
St. Louis, Mo.....		30.65	June 11
St. Louis, Mo.....		1909.	
St. Louis, Mo.....	July 12–21 (10 days).....	35.25	July 16
St. Louis, Mo.....		111.7	July 15
St. Louis, Mo.....		22.6	Do.
St. Louis, Mo.....		31.8	Do.
St. Louis, Mo.....	None, 1910–1912.		

¹ No reading.

File 1926-37.

EAST ST. LOUIS, ILL., November 12, 1913.

To the honorable President and Members of the Mississippi River Commission.

GENTLEMEN: The board of trustees of the East Side levee and sanitary district the counties of Madison and St. Clair, State of Illinois, respectfully submits the following:

1. The East Side levee and sanitary district was created under an act of the General Assembly of the State of Illinois, entitled "An act to create sanitary districts in certain localities and to drain and protect the same from overflow for sanitary purposes" being House bill No. 783, approved May 17, 1907.

2. The general plan of sanitation adopted by the board of trustees contemplates the expenditure of about \$6,500,000.

3. The boundaries of this district embrace 96.32 square miles, in what is known as the American Bottoms, and in order to protect same from floods of the Mississippi River it is necessary that a levee about 30 miles in length be constructed. Of the 30 miles over 4 miles of cross levee to protect the district on the north and over 3 miles of front levee have been built, and about 3 miles are now under construction. This, together with the excavating of the Cahokia Creek Diversion Channel, comprises the work done by the district since its creation. From these figures it can be seen that there is still to be constructed about 10 miles of levee in order to protect the part of the district lying between Pittsburgh Dike and Prairie du Pont Creek.

4. The population of the district is estimated at 125,000, and the assessed valuation of the property therein over \$20,500,000. Twenty-seven railroads traverse the district making East St. Louis and Granite City, the two principal cities therein, points of great commercial and industrial advantage. This advantage can only be used, and the safety of life and property of the inhabitants can only be insured by adequate protection from floods of the Mississippi River.

The levees so far completed, except for a distance of about 2 miles, have not as yet received the revetment on their outer slope, which is necessary in order to render their efficiency sure and lasting. This revetment, which consists of a slab of concrete 6 inches thick, is estimated to cost \$600,000.

5. The levee yet to be constructed, south from Pittsburgh Dike to Prairie du Pont Creek, and thence to the bluffs on the east, is estimated to cost \$1,000,000, including right of way.

6. The financial condition of the district makes it impossible to begin either the work of revetment of levees already constructed or the construction of the levee south of Pittsburgh Dike for a period of 1½ years, for the reason that all the resources of the district for that length of time must be applied to outstanding liabilities in paying for work already done.

Statement.

Legal limit of indebtedness of district.....	\$1,025,000
Total bonds outstanding.....	\$829,000
Other liabilities.....	196,000
Total.....	1,025,000

7. Of the income of the district, which is derived from direct taxation on all property therein, about \$300,000 per year is applicable to levee building and revetment work, and as there is still to be done work amounting to \$1,600,000 it can be seen that a period of six to seven years must elapse before the inhabitants of the district can be afforded absolute protection from floods of the Mississippi River.

8. As approximately \$2,500,000 has already been spent by the district in the work above described, it is very important that the levees already constructed should receive their revetment at once, for in their present condition it is quite probable that they will not be able to withstand a high flood stage of the river; should these levees fail, the inhabitants of the district would not only lose the benefit of their large investment, but the damage to property and health would be enormous. It is estimated that the damage done by the flood of 1903 amounted to \$5,000,000. This does not include the great loss and damage to the country by the large incident to delays to traffic, both freight and passenger, and delays in the transportation of mail, this being one of the important railroad centers of the country.

9. Inasmuch as your honorable body was, among other things, authorized, in the river and harbor act of November 4, 1913, to "make an examination of the Mississippi River from Cape Girardeau, Mo., to Rock Island, Ill., with a view to the improvements as will protect property adjacent to said river from damage by floods

and in making such examination consideration shall be given and recommendations made as to plans for cooperation by the localities affected," the board of trustees of the east side levee and sanitary district do respectfully submit that this district is entitled to your consideration and to a recommendation from your honorable body to the National Government for financial aid in the completion of its levee protection.

10. Farm lands within the boundaries of the east side levee and sanitary district:

Total number of acres, exclusive of towns.....	51, 200
Total number of acres in cultivation.....	32, 000
Total number of acres not in cultivation.....	19, 200
Total number of this 19,200 acres which will be reclaimed by the work of the district.....	13, 000

This 13,000 acres, valued at \$200 per acre, will increase the value of cultivable lands in the district by \$2,600,000.

11. *East St. Louis.*—The growth of East St. Louis in the past 40 years from a village of less than 6,000 population to a city of about 75,000, in spite of the often-recurring floods to which it has been subjected, shows conclusively the great commercial advantages which by its location this city enjoys.

The following statistics have been furnished by the East St. Louis Industrial League:

Population of East St. Louis, Ill.:

1870.....	5, 644
1880.....	9, 185
1890.....	15, 169
1900.....	29, 655
1910.....	58, 547
1913.....	75, 000

Tonnage.—Thirty million tons of freight are handled in East St. Louis railroad yards per annum.

Public schools.—Twenty-seven public schools, including two high schools, representing property value of \$1,078,625, having a bonded indebtedness of \$342,300.

Streets.—Seventy-five miles of paved streets, having a total cost of \$5,500,000.

Sewer.—Outlet sewer, total cost, \$800,000.

Parks.—Eight public parks, having a bonded indebtedness of \$400,000.

The annual pay roll of East St. Louis industries will exceed \$20,000,000.

East St. Louis manufacturing plants have an annual consumption in tons, 3,000,000.

The number of industrial workers employed in East St. Louis manufacturing plants, 5,000.

12. *Granite City, Madison, and Venice.*—These cities, with a total population of 10,000, form one of the most important manufacturing and railroad centers in the State. The manufacturing plants of these cities employ 20,000 workers, with a total pay roll of \$1,500,000 per month.

13. By reference to the river and harbor act of July 25, 1912, it is noted that said act provided for an appropriation of \$250,000 to be used for the building of a levee in and around the city of Cairo, Ill., provided that the inhabitants of the territory to be protected raise a like amount to be used for the same purpose.

In view of the fact that the people of this district have expended the sum hereinbefore mentioned to protect this district from overflow, and in view of the further fact that in so doing they have taxed themselves since its organization to the limit allowed by the State constitution, and in view of the size and wealth of this district and its importance to the country at large, and in view of the fact that it is subject to destruction by overflow from the Mississippi River in the same manner that Cairo is subject to overflow, and that the conditions which demanded immediate action at Cairo may arise here at any high flood stage of the river, owing to the incomplete and unprotected condition of our levees, it is respectfully suggested to your honorable body that some arrangements be recommended by you in respect to the territory embraced in the boundaries of the East Side Levee and Sanitary District, either with a view toward the immediate completion of the levee south of Pittsburgh Dike or toward the protection of the levees already constructed, or both.

As there can be no question that the levee system as planned is a vital necessity to this territory, and as the inhabitants have voted to tax themselves heavily that

same shall be built, it seems only right and just that the Government should cooperate with them in some manner.

Trusting that the above may receive due consideration at your hands, and thanking you for this opportunity to be heard,

Respectfully,

G. L. TARLTON,
ROBT. R. CONWAY,
FRED W. MOLLMAN,
EARL R. JONES,
P. W. SUNDERLAND,

Trustees the East Side Levee and Sanitary District.

File 1926-37-1.

EAST ST. LOUIS, ILL., November 19, 1913.

To the honorable president and members of the Mississippi River Commission.

GENTLEMEN: In order that your honorable commission may have a more detailed reply to the questions asked by Col. L. H. Beach at the time of our recent meeting at St. Louis, the board of trustees of the East Side levee and sanitary district begs to submit the following, which is a copy of a report made to the board of trustees by the clerk at the end of the last quarter:

The following is a classification of the vouchers for claims and salaries allowed by your board for the months of July, August, and September, 1913, and the total for each account from date of organization of district:

Account.	Total, statement Aug. 1, 1913.	July, August, and September.	Total from organization
Trustees' salaries.....	\$27,058.25	\$1,500.06	\$28,558.
Clerical department:			
Salaries.....	21,635.00	1,125.00	22,760.
Supplies.....	2,775.36	83.45	2,858.
Treasury department:			
Salaries.....	6,591.66	375.00	6,966.
Supplies.....	82.40		82.
Emergency funds with clerk.....	2,000.00		2,000.
Engineering department:			
Office force salaries.....	58,690.73	1,875.00	60,565.
Field salaries.....	52,959.91	2,490.00	55,449.
Equipment of office and field expense.....	5,265.95	178.66	5,444.
Transportation.....	7,181.09	562.03	7,743.
Law department:			
Salaries.....	24,319.28	1,375.02	25,694.
Supplies and expense.....	2,148.58	884.59	3,033.
General account:			
Sundry claims.....	9,638.40	296.50	9,934.
Furniture and fixtures.....	2,067.07	150.00	2,217.
Office expense.....	6,573.30	345.71	6,919.
Printing proceedings.....	2,138.72	22.75	2,161.
Insurance and bonds.....	6,657.64	638.59	7,296.
Interest.....	95,738.88	23,750.00	119,488.
Bonds.....	675,000.00	275,000.00	950,000.
Right-of-way expense.....	603,063.56		603,063.
Construction project No. 1.....	671,827.56	36,107.76	707,935.
Construction project No. 2.....	30,139.91		30,139.
Construction projects Nos. 3 and 4.....	559,136.85		559,136.
Construction project No. 5.....	7,060.33		7,060.
Construction project No. 6.....	50,981.39		50,981.
Maintenance department:			
Salaries.....	1,416.46	300.00	1,716.
Supplies and expense.....	12,567.53	7,206.63	19,774.
Removing drift, Cahokia Creek.....	5,839.40	839.20	6,678.
Constructing cut-offs, Cahokia Creek.....		2,552.52	2,552.
Police department, salaries.....	200.00	150.00	350.
	2,950,755.21	357,808.47	3,308,563

Construction project No. 1: Cahokia Creek diversion channel, including $4\frac{1}{2}$ miles of levee on each side thereof.

Construction project No. 2: Front levee, 3.30 miles.

Construction projects Nos. 3 and 4: Front levee, 10.03 miles.

Construction project No. 5: Levee in front of East St. Louis, in course of construction.

Construction project No. 6: Floodgates at mouth of Cahokia Creek, including 600 feet of clay levee.

Fifty-five one-hundredths mile of construction project No. 3 and all of construction project No. 4, 1.82 miles, are built of clay, hauled by train from the bluffs east of the district. The other sections of the levee are constructed from side borrow.

Deducting \$950,000 payment of bonds from the total leaves \$2,358,563.68 as the amount which has been expended by the district from its organization to October 1, 1913.

Trusting that the above may meet with your kind approval,

Respectfully,

G. L. TARLTON,
ROBT. E. CONWAY,
FRED W. MOLLMAN,
EARL R. JONES,
P. W. SUNDERLAND,
Trustees.

File 1926-38.

ON BOARD STEAMER "MISSISSIPPI,"
Cape Girardeau, Mo. November 14, A. D. 1913.

To the MISSISSIPPI RIVER COMMISSION

(C. McD. Townsend, Col., Corps of Engineers, president):

The undersigned, commissioners of the East Cape Girardeau and Clear Creek drainage district, in Alexander County, Ill., being advised by yours of October 31, 1913, that your commission would be glad to grant a hearing to the undersigned at Cape Girardeau, Mo., upon arrival of the steamer *Mississippi* on November 13, 1913, with request therein that we embody the essential features of our conditions and needs in a written statement that the same may be filed for future reference, now desire to thank you for the said opportunity, and to supplement what we may say at said hearing by the following written statement, viz:

The East Cape Girardeau and Clear Creek drainage district is a quasi municipal corporation, declared duly established as provided by law by order of the county court of Alexander County, Ill., entered of record on November 17, A. D. 1908; that said district was so established under the laws of the State of Illinois, viz: The levee act—so-called—of May 29, 1879, as amended; that said district lies entirely within the county of Alexander, State of Illinois, and lies adjacent to the Mississippi River; that the lands embraced within said district comprise 9,391.88 acres actually assessed for benefits; that said district is located in the northwest part of said Alexander County, and comprises about 8 per cent of said county, and said district is about 4½ miles in length with an average width of about 4 miles; that the village of McClure is at the northeast edge, Gale at the southeast edge, and East Cape Girardeau at the western edge; that the soil of the district is black alluvial, and 90 per cent of the lands in said district are under cultivation with about 7 per cent of the lands in timber; that no portion of the lands are swamp lands; that the lands under cultivation grow corn, wheat, hay, potatoes, and gardening, etc.

That the lands in the district lie in a valley bounded on the east by the hills and bluffs and on the west by the east bank of the Mississippi River; that the tendency of the water from said river at every flood stage is to break over the river bank and flow to the bluffs; that the said district was organized to protect the said lands embraced therein from the water of said river at flood stages by the construction of a protective levee system with system of ditches to take care of the surface waters; that to do this, the work as planned as sufficient for the purpose when undertaken was the construction of approximately 11 miles of protective leveework along the Mississippi River, with ample ditches for taking care of the surface water falling upon said lands; that the estimated cost of said work was \$79,273.02; that an assessment for said amount was confirmed on November 30, 1909, payable in 20 installments, the first installment maturing January 1, 1911; that 77 bonds, aggregating the sum of \$71,345, were authorized and sold to secure the funds for said work, said bonds being secured by said assessment and payable July 1, 1911, to July 1, 1930, both inclusive; that to complete the work authorized and do additional work (the necessity for which arose from the flood of 1912) a second assessment was on November 6, 1912, confirmed by said court for the sum of \$10,500, divided into 5 installments, the first maturing January 1, 1914, and 19 bonds secured by said second assessment, aggregating \$9,450, were authorized and sold, maturing July 1, 1914, to July 1, 1918, both inclusive; that the work authorized has been practically completed; that the owners of the lands have promptly paid the installments so far as they have matured, and the bonds so

far as they have matured have been promptly paid, as well as the interest thereon that the security to the holders of said bonds, as well as to the owners of the lands is based upon full and adequate protection against the flood waters of said river; that to secure what was expected to be adequate protection the owners of said lands have submitted to two assessments, as above stated, aggregating approximately \$90,000 and practically said aggregate amount has been expended for said purpose without any outside assistance; that the benefits of said expenditures are jeopardized for reasons hereinafter stated.

Said district lies in Illinois, opposite from and north of Cape Girardeau, Mo.; that the Mississippi River is very narrow at Grays Point and the bend of the river at that point and obstructions caused by Rock Island at this point cause the water to be held in check against the levees of the East Cape Girardeau and Clear Creek drainage district; that it is necessary also that fences be maintained to keep out the current between Devils Island and Picayune Island and thereby protect the eastern bank of the Mississippi River and the embankment or levee of this district, as a current between said islands would otherwise leave the channel of the Mississippi River and cut away the said river bank and levee of the district; that the levee building and organization of drainage districts in Illinois and Missouri has the tendency to confine the waters of said river in the interest of navigation and make possible water power at a point near Thebes, Ill., but such levee work also raises the flood stage in the said river opposite the East Cape Girardeau and Clear Creek drainage district; that the building by the United States Government of the levee on the west bank of the Mississippi River between Cape Girardeau and Grays Point necessitates the raising of the levees of the East Cape Girardeau and Clear Creek drainage district, as the waters of the said Mississippi River before the construction of said levee in Missouri by said United States Government had a relief outlet, which the construction of said levee has eliminated that the contemplated work of the Little River drainage district in Missouri—contract for construction of which has been let—turns White Water and Castor Rivers into the Mississippi River so as to make an outlet opposite the south part of the levee of the East Cape Girardeau and Clear Creek drainage district, thus permitting the waters from said rivers to enter the Mississippi at a point they otherwise would not and thereby raise the flood level opposite the East Cape Girardeau and Clear Creek drainage district; that by reason of the above it becomes necessary, to afford the needed protection to the lands within the said East Cape Girardeau and Clear Creek drainage district, that the protective levee of said drainage district along the said Mississippi River, and forming the western boundary of said district, be increased in height; that to secure the needed protection will require that said levee be raised 2 feet above the present height with side slopes of the present existing levee embankment of 3 to 1 on the river side and 2 to 1 on the land side; that upon the basis upon which the present embankment was built the cost of constructing said additional 2 feet would be approximately the sum of \$45,000.

That said increase in height is a condition arising since the district was planned and is due to conditions over which the undersigned have no control; that it is a hardship upon the owners of the lands within the said district, after the expenditure of the amount so expended for full and adequate protection to their lands, to have to expend said further large sum to protect their said lands as against conditions brought about in part at least by the constructions by the United States Government in the aid of navigation; that the increasing of the height by 2 feet of said levee of this district would not only be in further aid of navigation but also assure the owners of lands within said district from damages from floods.

Wherefore the undersigned would respectfully petition and ask that this commission, in making its plans and recommendations for "Improvements as will at the same time promote navigation, develop water power, and protect property adjacent to said river (Mississippi) from damage by floods," will include in such plans and recommendations that a portion of its appropriations now secured for said purpose and that may hereafter be available for said purposes be utilized in giving financial aid for the raising of the levee of this district said additional of 2 feet to the extent that your honorable body may deem fair and just in consideration of what has been stated and the amount of money expended, through the undersigned, by the owners of the lands within the East Cape Girardeau and Clear Creek drainage district. The undersigned have heretofore submitted a map of the district and other data to the secretary of your commission and will be glad to furnish any additional information and attend any conferences that your honorable body may suggest.

Respectfully submitted.

A. C. JAYNES,
JOS. BUNCH,
IRA HASTINGS,

Commissioners of the East Cape Girardeau and Clear Creek Drainage District.

Same file.]

The commissioners of the East Cape Girardeau and Clear Creek drainage district would further add that the valley between Gale, Ill., and Degonia Creek, on the Illinois side of the Mississippi River, contains something over 82,357.39 acres of very fertile land, the greater portion of which is in cultivation. This territory is divided into six levee and drainage districts, commencing at said Gale, Ill., viz:

	Acres.
East Cape Girardeau and Clear Creek drainage district	9,391.88
North Alexander County drainage district, organized Apr. 2, 1910	3,700.00
Clear Creek levee and drainage district, organized 1913	18,000.00
Preston levee drainage district, organized June 26, 1913	19,055.82
Grand Tower district, organized 1908	2,600.00
Degonia and Fountain Bluff levee and drainage district, organized 1910 ..	29,609.69

The first, fifth, and sixth of said named districts have constructed their levees; the others of said districts have been duly organized but have not as yet let contracts for their levee, etc., work; that said valley is bounded on the east by the hills and bluffs and adjoins the east bank of said Mississippi River, and the tendency of the water from said river at every flood stage is to break over the river bank to the bluffs, thereby placing the said entire territory in about the same position; that is to say, the work done for one of said districts is good for the others if each of said districts is aided in the construction of its protective embankments, otherwise the water from said river would enter each said district from the south (back-up) and thereby flood such district unless the levee on the east bank of the said Mississippi River from Gale to Degonia Creek is all raised; and if the levee of each said district is raised, such work will benefit each district when done, and also all said districts, and without such work no district will receive adequate protection without doing other and additional work, which additional work is in part avoided if all said districts are aided by the increasing of the embankment from Gale to Degonia Creek by 2 feet above the present authorized height of the levees as have been constructed and those now arranged for but not as yet constructed.

The undersigned would therefore further ask that your honorable body in making its plans and recommendations would recommend plans for increasing the height of the levees now constructed and those now arranged for but not as yet constructed from Gale, Ill., to Degonia Creek, Ill., by 2 feet; that by aiding each said district benefits can be secured for all said districts, whereas if less than all are aided the remaining districts will have other and further work to do to protect the lands within their districts; that increasing the height of the levees along the east bank of the Mississippi River from Gale to Degonia Creek will prevent damage by flood waters to a large body of lands adjacent to said river, will aid in navigation of said river by confining the waters to a definite channel, which will develop water power near Thebes, Ill.; and that each said district, in view of the amount of money to be expended and which has been expended to secure the protection from flood waters from causes for which the general public are benefited, should have some portion of the additional cost paid by the United States Government as benefits accruing to the public from such work. We would therefore ask that your honorable body give such aid for said purpose from the United States Government appropriation now available, as well as that which may hereafter be made available upon plans your honorable body may recommend, as may appear just and equitable in view of the amounts to be expended by each such district.

Respectfully submitted.

A. C. JAYNES,
JOS. BUNCH,
IRA HASTINGS,

*Commissioners of the East Cape Girardeau
and Clear Creek Drainage District.*

Copy of 1926-39.

L. C. McD. TOWNSEND,

Corps of Engineers, President of the Mississippi River Commission:

The undersigned, commissioners of the Clear Creek drainage and levee district, respectfully represent that said district is a corporation established by an order of the county court of Union County, in the State of Illinois, under and by virtue of the authority vested in that court by an act of the Legislature of the State of Illinois, entitled "An act to provide for the construction, reparation, and protection of drains, ditches, and levees across the lands of others for agricultural, sanitary, and mining purposes, and to provide for the organization of drainage districts." (Approved and in force May 29, 1879.) This act is that part of chapter 42 of the Illinois Statutes known as the levee act.

We further represent that said district is bounded on the east by a hill line, on the north by a line beginning approximately at the northwest corner of section 29, township 12 south, range 2 west of the third principal meridian, in Union County; thence running westward approximately on a straight line to the Mississippi River; thence down the Mississippi River to the north part of section 9, township 14 south, range 3 west, Alexander County, Ill.; thence in an easterly direction to the hill line, containing approximately 18,000 acres of land, all of which is susceptible to overflow from the Mississippi River, and all of which will be made good, tillable land by other improvements to be made by said district if protected from overflow from the Mississippi River.

We further represent that since the construction of the bridge across the Mississippi River at Thebes overflows have been much more disastrous to this territory than those previous to that time; that a comparison of the stages of various waters at St. Louis, Cape Girardeau, and Cairo will show that the building of levees south of Cairo and the construction of this bridge have rendered agriculture in this district exceedingly hazardous, and is the direct cause that has discouraged and driven away many of the most successful tillers of its soil.

We further represent that said district proposes to construct a levee along the Mississippi River, beginning near the corner of sections 21, 22, 27, and 28, township 12 south, range 3 west, in Union County, Ill., at which point said levee is to connect with a proposed levee of the Preston levee drainage district. Said levee is to run thence along the river front and across Clear Creek at a point near its mouth, a total distance of approximately 11 miles, where it will connect with the existing levee of the East Cape Girardeau and Clear Creek levee district at a point in the north part of section 9, township 14 south, range 3 west of the third principal meridian, in Alexander County, Ill. Said levee is to have a height of 4 feet above the high-water mark of the year 1903; with a 4 by 4 feet muck ditch, a 4-foot crown, and with a slope of 3 to 1 on each side.

It is further represented that to construct said levee the engineer of said district has estimated that it will require 556,660 cubic yards of earth, which is estimated to cost 14 cents per cubic yard. It is estimated that the said levee, together with the right of way and other expenses necessary to be incurred, will increase this to 20 cents per yard, amounting to a total cost of \$111,332.

We further represent that said district proposes to construct another levee, beginning at a point about the center on the north line of the northwest quarter of section 12, township 14 south, range 3 west, in Alexander County, at which point it intersects with a levee proposed to be built by the north Alexander County drainage district, which is particularly described in the petition of that district presented herein. From said point said levee extends in a northeasterly direction to the north line of said district. Said levee is of the length of approximately 10 miles, and is to be built with a 4-foot crown, a slope of 3 to 1 on each side, and of sufficient height to be 5 feet above the high-water mark of the year 1903. To construct which, it is estimated will require 652,211 cubic yards of earth, which is estimated to cost 14 cents per cubic yard. It is estimated that the construction of the levee, and the procurement of the right of way and other expenses necessary to be incurred will increase this cost to the sum of \$114,498.

We further represent that Clear Creek runs along the hill line of said district the entire length of said district, and it is proposed to dredge and straighten said Clear Creek, and that the total estimated cost to be assessed as benefits in said district is the sum of \$245,000.

We further represent that the commissioners of said district have completed their roll of assessments of benefits and damages, and that the same is set for hearing before a jury on the 24th day of the present month, and that in all probability this district will be ready to contract for work in January or February, 1914.

It is further represented that during high water in the Mississippi River there is a tendency for the river bank to cave in at a point in the south part of section 35, township 12 south, range 3 west, Union County, to prevent which an improvement should be made at some point on the west line of section 21, in said township, and another improvement should be made on the river at a point on the west line of section 26, township 13 south, range 3 west, Union County, for the purpose of diverting the water west of Devils Island for the purpose of protecting the levees of this district and the East Cape Girardeau district.

It is further represented that no back water from the Mississippi River under the present plan will ever reach to the north end of the back levee to be constructed by this district.

SAMUEL F. DAVIE,
JAMES T. MCCLURE,
Commissioners of said District.

[Degognia and Fountain Bluff levee and drainage district.]

File 1926-40.

MURPHYSBORO, ILL., November 10, 1913.

The MISSISSIPPI RIVER COMMISSION,
St. Louis, Mo.

GENTLEMEN: The subscribers, commissioners, and engineer of Degognia and Fountain Bluff levee and drainage district, in the county of Jackson and State of Illinois, understanding that your honorable body wishes—at least, that you invite—requests and representations from and by the authorized representatives and agents of organized levee-drainage districts bordering on and adjacent to the Mississippi River concerning the needs of such districts, respectively, and the work required or which might advantageously be done by or under the direction of your body in aid of the improvement of navigation of the Mississippi River and incidentally, at least, the protection of the lands adjacent to the river and within such districts from overflow and inundation respectfully represent to you and state:

First. Copies of the map and profiles of this district have already been furnished to your body.

Second. The district embraces some 29,609.69 acres of land in Jackson County, Ill., within which area is included one incorporated and three unincorporated villages, in each of which is a post office and a railroad station, and the estimated total population is 1,500 persons.

Third. The length of the levee embankment extending along and adjacent to the Illinois bank of the Mississippi River from Degognia Creek (the line between Randolph and Jackson Counties) is approximately 17 miles, and the levee work of the district has been constructed at a cost of \$162,016.57, being an average cost per acre (exclusive of an assessment of some \$17,800 on railroad property) of \$4.507, besides which some 15,000 acres of the land previously organized into drainage districts for the drainage and reclamation of large lakes and ponds within the area had been assessed for drainage at sums varying from \$3.75 to \$18 or \$19 per acre.

Fourth. The levee embankment is constructed to a grade, or height, which is the estimated equivalent of the top of the water in the river opposite the levee when the river is at a stage of 40.8 feet on the gauge at St. Louis, having a top width varying from 5 to 8 feet and side slopes of 2 to 1, save a portion near the upper end where the slope is 3 to 1.

Fifth. Considered with reference to and in view of high-water levels and flood conditions known prior to 1912 (save for the year 1844) that levee embankment was deemed adequate for protection from overflow and inundation, but in the light of the high-water levels in the Ohio River attained in 1912 and 1913 and the conditions hereby produced, it can not be safely so regarded. The facts are: Because of the extremely high stage of water in the Ohio River in each of those years the stage of the water in the Mississippi River (in front of the levee) ranged from 3.5 to 5 feet higher than the existing stage of the water in the river at St. Louis would have produced and marked; so that had the water in the river then attained at St. Louis the stage of 38 feet (as in the flood of 1903), the levee would have been entirely submerged and the whole district inundated.

Sixth. In view of the last above-recited considerations, it is believed and respectfully submitted that the levee embankment should be uniformly increased in height 2 feet, to the uniform top width of 6 feet, and the slopes on the sides be made uniformly 3 to 1. The estimated volume of added earth embankment required to do this is 510,000 cubic yards, and the estimated cost per cubic yard is 20 cents, amounting to \$102,000.

Seventh. To protect the levee embankment from destruction or injury that would result from erosion of the river banks, at the same time, as it is believed and respectfully suggested, improving the river channel for the purposes of navigation, the riprap or revetment work at and in the vicinity of Wagners Landing should be maintained and kept in repair; and the like work should be promptly undertaken and done along the river bank at and in the vicinity of Lower Wilkinsons Landing, so constructed as to cause a divergence of the current away from the Illinois and toward the Missouri shore, to prevent the erosion of the banks at and below that point. Also, the work is needed and should be promptly done at and in the vicinity of Brunkers Landing.

Respectfully submitted.

HENRY ARBEITER, Sr.,
F. J. RADDLE,
H. L. BRICKEY,
Commissioners.
JOEL DUNN, Engineer.

File 1926-41.

Col. C. McD. TOWNSEND,

Corps of Engineers, President of the Mississippi River Commission:

The undersigned, commissioners of the North Alexander County drainage district, respectfully represent that said district is a corporation established by an order of the county court of Alexander County, in the State of Illinois, under and by virtue of the authority vested in that court by an act of the Legislature of the State of Illinois, entitled "An act to provide for the construction, reparation, and protection of drains, ditches, and levees across the lands of others, for agricultural, sanitary, and mining purposes, and to provide for the organization of drainage districts." (Approved and in force May 29, 1879.) This act is that part of chapter 42 of the Illinois Statutes known as the levee act.

We further represent that said district is bounded on the east by a hill line, out of which flows a number of streams which empty into Horse Creek, and this creek meanders along the said hill line and empties into the Mississippi River in the northwest quarter of section 4, township 15 south, range 3 west, Alexander County, at a point known as Gale. Said district extends from said point northward to a point in section 12, hereinafter mentioned. That the waters of Horse Creek are so precipitous and of such large quantities as to render any system of water gates or pumping plants impracticable. Said district is bounded on the north by Clear Creek, beginning about the quarter corner on the north line of section 12, township 14 south, range 3 west, Alexander County, and extending westward practically on a due line to the center of the right of way of the Illinois Central Railroad Co., which is substantially the quarter-quarter corner, on the north line of the northeast quarter of section 9, township and range aforesaid. The west line of said district is the center line of said railroad, which is practically a due south line from said quarter-quarter corner. The railroad practically meets the hill line at the south end of the district, said Horse Creek lying between. This district contains approximately 3,700 acres of land, all susceptible to overflow from the Mississippi River, and all of which will be made good, tillable land by other improvements to be made by said district, if protected from overflow by the Mississippi River.

We further represent that the East Cape Girardeau and Clear Creek drainage district has already constructed a levee from said point in section 9, along the south bank of Clear Creek to the Mississippi River, and along its bank to said point at Gale.

We further represent that since the construction of the bridge across the Mississippi River at Thebes overflows have been much more disastrous to this territory than those previous to that time; and the construction of a levee between Cape Girardeau and Grays Point has greatly added to the destruction; that a comparison of the stages of various waters at St. Louis, Cape Girardeau, and Cairo will show that the building of levees south of Cairo and south of Cape Girardeau and the construction of this bridge have rendered agriculture in this district exceedingly hazardous, and is the direct cause that has discouraged and driven away many of the most successful tillers of its soil.

We further represent that said district proposes to construct a levee to a height of 5 feet above the high-water mark of the year 1903, with a 4-foot crown, and with a slope of 3 to 1 on each side. Said levee to extend from a point in said section 4, aforesaid (where it connects with the levee of said East Cape Girardeau and Clear Creek district), in a northeasterly direction, a distance of approximately 7 miles, to a point about the center on the north line of the northwest quarter of said section 12, township 14 south, range 3 west, at which point it is to intersect with a levee proposed to be built by the Clear Creek drainage and levee district, which is particularly described in the petition of that district, presented herein.

We further represent that to construct said levee the engineer of said district has estimated will require 334,420 cubic yards of earth, which is estimated to cost 14 cents per cubic yard. It is estimated that the right of way and other expenses necessary to be incurred will increase this to 20 cents per yard, amounting to a total cost of \$66,884.

We further represent that it is proposed to divert Clear Creek from a point in section 12, aforesaid, along said hill line into said Sexton Creek, and that the total estimated cost of the proposed work of this district is the sum of \$100,000.

We further represent that the commissioners of this district are now preparing their roll of assessments of benefits and damages, after which a hearing will be had before a jury upon said matter, and when that is concluded the contract for the work may be let.

Respectfully submitted.

J. E. HEDGES,
JAMES T. McCLURE,
Commissioners of said District.

File 1926-42.

GRAND TOWER, ILL., November 13, 1913.

To the MISSISSIPPI RIVER COMMISSION,

St. Louis, Mo.

GENTLEMEN: The subscribers, commissioners of Grand Tower drainage and levee district, in the county of Jackson and State of Illinois, respectfully represent unto your honorable body and state:

First. Said drainage and levee district embraces some 2,600 acres of land in Jackson County, Ill., situated and lying between the Mississippi and Big Muddy Rivers, near the confluence of said two streams.

Second. The levee embankment constructed by the authorities of the district is about 5 miles in length and is along and adjacent to the Big Muddy River, the protection from overflow directly from the Mississippi being afforded, for a great portion of the length of the westerly boundary of the district, by the embankment and roadbed of the Illinois Central Railroad and a high ridge which forms the rim of a slough paralleling the last-mentioned river, but the grade of that railroad embankment and ridge is below the high-water mark of 1903, which is the grade also of the levee embankment of the district.

Third. In view of the high-water levels of the years 1912 and, 1913 it is believed that to afford adequate protection from overflow the levee embankment of the district should be raised at least 4 feet, and an embankment of like grade be constructed on the west boundary of the district.

Fourth. The volume added earth embankment necessary to do this is estimated at 370,000 cubic yards, the estimated cost of which is 16 cents per cubic yard, amounting to \$59,200.

Respectfully submitted.

C. C. HUTHMACHER,
M. W. BAYSINGER,
C. D. GARDINER,
Commissioners.

File 1926-43.

CHESTER, ILL., November 13, 1913.

To the MISSISSIPPI RIVER COMMISSION:

Pursuant to your invitation to the commissioners of Kaskaskia Island sanitary and levee district to meet with you at this time and place for the purpose of laying before you the improvements proposed by said corporation on Kaskaskia Island in the Mississippi River, we beg leave to submit herewith a brief outline of our proposed improvements and our needs, together with a report of our engineers giving all the data on the subject we are able to give at this time.

PHYSICAL CONDITION.

There is no need of us dwelling upon the physical conditions on this island to your honorable body further than is contained in our engineer's report attached herewith. And as to the formation of the island and the action of the river in and around the island, your honorable body is no doubt better informed from your own reports and information than we could possibly give you in this report. Suffice it to say, however, that there is one point on the east side of the island where the river cuts the island very much and which we feel could be prevented without great expense to the Government, and which when done would be of great assistance to the navigable channel at that point, and we therefore submit that to your careful investigation and consideration.

HISTORICAL.

The mission of the Immaculate Conception was located in the upper end of this island, where the Mississippi River cut across into the Kaskaskia River, in 1700, by Father James Gravier, the settlement being known as "Our Lady of Kaskaskias." It being designated as the "Parish of Immaculate Conception of Kaskaskia." The settlement prospered more or less as the early settlements did in those days. The country was claimed and held by the French until 1763. In 1722 the French governor at New Orleans made a grant of commons to the settlers at this point, but the grant seems to have been lost and no record of it has been found. The earliest record of this grant being found by Prof. Alford, of the University of Illinois, among the French papers at Chester, Ill., and Belleville, Ill., which was a petition by the settlers to the governor at New Orleans asking him to make certain regulations for the

use of the commons. Upon petition of the inhabitants, however, this grant was confirmed by the governor of New Orleans with the approval of the King of France in 1743. This grant is of record in the State auditor's office of Illinois and has proved to be the basis of the title of the inhabitants of the island to these lands.

The size of the commons has varied with the action of the river. The earliest record of any survey of them, however, is found in volume 2, American State Paper at page 148, the plat bearing date of September 21, 1807, which then showed the common field to be 8,203 acres, and the commons to consist of 6,950 acres. By the original grant the commons were granted to the "Inhabitants of the parish of the Immaculate Conception," for wood and pasturage, and they were used as such until 1851. Illinois by its constitution of 1818 provided that all commons held by any settlement in the State should forever remain as commons and be held in common. No further legislation appeared in relation to these commons until the constitution of Illinois of 1848, which reiterated the statement made by the constitution of 1818 in relation thereto, but added that the inhabitants entitled to the use of such commons by a majority of the legal voters, might petition the legislature and obtain from the legislature permission to sell or lease said commons. Under that provision of the constitution of 1848 the inhabitants of the island of Kaskaskia petitioned the Legislature of Illinois and obtained legislation giving them the right to lease said commons for a period of 50 years. Under that law, at various times, portions of the commons were surveyed and leased for periods of 50 years at a small cash rental. The same act provided that the rents should be used for the education of the children of the town of Kaskaskia, the lessees of the commons, and those who by immemorial custom were commoners upon said commons.

The village of Kaskaskia claimed the sole right to the use of the rents from said lands and appropriated the entire sum to the schools within the village. There also arose in the leasing of said commons from time to time some irregularities which caused a great deal of dissension among the settlers about the management. As a result of which, in 1905, a petition was signed by many of the settlers and presented to the governor of Illinois, asking that he correct some of the abuses that had grown up in the management of the common lands. That petition was referred to the attorney general, Hon. William H. Stead, who employed Mr. Emery Andrews, one of our present counsel, to look into the matter, with the result that Mr. Stead filed a suit in equity to correct the abuses that had grown up, which was taken to the Supreme Court of Illinois. Its decision may be found in volume 243 Illinois at page 223, which litigation terminated very much in favor of the inhabitants and against the trustees.

But it left the common lands still held in common, so that no improvements could be made upon the island, and nothing could be done to protect themselves from the ravages of the river. So it was finally determined by the inhabitants to again petition the legislature under the constitution of 1848, the constitution of 1870, the last constitution adopted by the State having made no mention of the commons, to pass an act enabling them to sell the common lands. The general assembly passed such an act which took effect July 1, 1909. This act, however, was then attacked as being unconstitutional, but was approved by the Supreme Court of Illinois in volume 243 Illinois at page 578 of the supreme court reports.

Pursuant to that act the governor of Illinois appointed three land commissioners to survey and sell the common lands, most of the long-time leases on the same having been canceled by the decision of the supreme court. This act authorizing the sale provided that the proceeds of the sale should be placed in the State treasury as a trust fund, the proceeds thereof to be used for the maintenance and support of the schools upon said island. The land commissioners proceeded to resurvey and sell the lands, and after paying all expenses deposited in the State treasury of Illinois \$252,000 the net proceeds of said sale, which said sum is to be invested by the State treasurer and the State auditor for the benefit of the schools of the island. The sale being completed, the inhabitants of the island then turned their attention toward the improvement of the island, as the way was now clear for that work. It was determined to ask the Legislature of Illinois for a special act, so they petitioned the legislature to organize a special sanitary and levee district for them, and also to permit them to use the excess of the income of the \$252,000 not needed for school purposes to aid them in improving the island.

It should be noted here that when it was determined to sell the common lands the largest amount the people hoped to realize from that sale was about \$125,000, but it turned out to be more than double that amount, which at 5 per cent produced an income of over \$12,000 a year. So far their schools had never needed over \$2,500 a year, and it was desired that the surplus, which would be anywhere from \$6,000 to \$9,000 per year, should be used to help make these improvements. Two separate bills

were introduced in the last General Assembly of Illinois to carry out the objects of the petition. There was some opposition, however, to the bill seeking to use the excess income of the school fund for levee purposes, with the result that we had to abandon that bill, but succeeded in getting our special levee bill through, a correct copy of which bill we herewith submit.

We have proceeded to organize under that law, the undersigned being appointed commissioners by the circuit court of Randolph County to carry out the objects and purposes, and pursuant to that law we have made a preliminary assessment of \$5,000 to pay for engineering on the island and to determine the kind, nature, character, and extent of the improvements we are making. There is now a little less than 14,000 acres of land in the island proper. We estimate that we can redeem at least 10,000 acres of this land from overflow by means of levees, and it is possible that we may redeem 2,000 more. How much we can redeem all depends to some extent upon the action of the river upon the east bank of the island, as in one place at least it has been cutting very badly. We have got to issue bonds for 20 years to raise the money to build our levee. The value of these bonds and their sale will depend materially and largely upon what allowance is made for the action of the river, and to protect the banks of the island from the ravages of the river is an expense which we feel we should not be called upon to meet. As your honorable body will note by the engineer's report attached, we are a small community and for the last 12 years our island has overflowed to a more or less extent every other year, one or two years completely. Our population has decreased on account of the physical conditions. Where there were houses on nearly every 40 acres 12 years ago, there are only a few now. We have either not to protect the island from overflow or abandon it, and what few of us are left have banded together for one hard, last effort to save this fertile land. Some of this land sold at the public sale as high as \$69 an acre, but with the understanding that an effort would be made to levee the island and protect it from overflow. Other lands on the island have sold within the last year and a half for \$100 an acre, at with the general understanding that the island would be protected from overflow. If we succeed in our improvement, this land that is so protected will be worth anywhere from \$150 to \$200 an acre. Probably the oldest cultivated fields of Illinois are on this island and with a little rotation of crops to-day will yield as much as any land that can be found in the Mississippi Valley. We therefore feel that the effort to redeem the island is worth while.

We do not know yet what this improvement will cost, but we are estimating that it will probably cost the landowners of the island around \$250,000. We hope in the next legislature to get permission to use the excess income from our school fund to help take care of the interest on our bonds. But it is desired by no one to molest the principal of that fund. We suffered from the old commons grant more than we knew, for it impeded our progress, but we are now free from that, and we have kept up and maintained the oldest settlement, and one of the oldest churches in the State of Illinois, and we have cultivated the grounds cleared by our ancestors 200 years under most adverse circumstances. But we finally got the spirit of progress, cleared the ground for action by selling the commons, and notwithstanding the fact that three-fourths of our people are in debt on our land, and trying to pay out and red it, we are willing to assess ourselves for the cost of the necessary levee ditches and internal improvements that we may need, and we feel that in the light of this fact, the further fact that the work on the east bank of the island will aid navigation, that your honorable body should consider our claims to having that work done at public expense.

If we were a large, rich community we perhaps could handle it ourselves, but as it is not just and right that we should do it, and as the work will be a great public benefit to navigation, and will have to be done sooner or later, we humbly beg of you to do it next year, so that we may get the benefit of it in selling our bonds for improvements, which we hope to have ready to offer by June or July of next year.

WM. H. DOZER, *President.*

WM. SULZER, *Secretary.*

E. C. KERR,

Commissioners of Kaskaskia Island Sanitary and Levee District.

By A. E. CRISLER,

EMERY ANDREWS,

Attorneys for Commissioners.

Same file.

[Kaskaskia Island sanitary and levee district.]

ENGINEER'S REPORT.

Organization.—The district is organized under an act of the Forty-eighth General Assembly of the State of Illinois, entitled "Senate bill No. 272. A bill for an act to create the 'Kaskaskia Island sanitary and levee district,' to comprise the island of Kaskaskia in Randolph County, and to provide for the construction, reparation and protection of drains, ditches, and levees for sanitary and agricultural purposes therein, and to punish anyone impairing any of the work done by the said district." Commissioners: William H. Doza, president; William Sulser, secretary; E. C. Kern, Engineers: T. N. Jacob, consulting engineer; Wilford A. Thompson, chief engineer. Attorneys: Emery Andrews, Mattoon, Ill.; A. E. Crisler, Chester, Ill. William P. McDonald, clerk; Charles C. Burch, treasurer.

LOCATION.

Kaskaskia Island is situated in Randolph County, Ill., about 2 miles above Chester in the Mississippi River.

TRANSPORTATION.

Shippers of products of the island will have all the advantages of river transportation. Chester is reached by ferryboat and offers a good market with its mills and railroads, viz, the St. Louis, Iron Mountain & Southern, Cotton Belt, Illinois Southern, and Wabash, Chester & Western; St. Marys, on the right bank of the old channel with its mill and St. Louis & San Francisco Railroad; Fort Gage, on the left bank of the channel and Riley Lake 1 mile above, with grain elevator, stores, and the following railroads: St. Louis, Iron Mountain & Southern, Cotton Belt, and Illinois Southern.

NATURAL SURFACE CONDITIONS.

The general surface of the island is level, slightly broken by light depressions that when connected by ditches, will facilitate drainage, aided by a pumping plant to discharge the water during high stages of the river.

CHANNEL AND SHORE LINE CONDITIONS.

Channel.—The channel of the Mississippi River formerly passed between the island and the Missouri shore, taking with it the waters of the Saline River, the Kaskaskia River passing between the island and the Illinois shore, but since about 1881 the channel passes to the Illinois shore, taking with it the waters of the Kaskaskia River. During low stages of the river all of the water passes between the island and the Illinois shore, except that from the Saline and other streams from the Missouri hills, which pass down along the Missouri shore to the foot of the island, then along the foot of the island to the Mississippi River. During stages of mean annual high water, 24.71 on east Kaskaskia gauge, the greater portion of the island is flooded and the channel on the Missouri side is materially widened, but in all stages a navigable channel is to the east.

Erosion.—The most serious bank erosion occurs on the head of the island and along the eastern shore. This shore line requires treatment to insure the navigable channel and to preserve the integrity of the levees after construction.

Levees.—The levees will be located as near to the shore line as good practice will permit. No field investigations have been made at this writing from which to fix the location of levees.

Type and height of levees.—The type of levee adopted will conform to the recommendations of the Mississippi River Commission, as in vogue in the southern district and of sufficient height to reasonably insure safety. The construction of levees will not be difficult. There will be very little timber encountered, and the material for levees is of good quality. Generally speaking, it is of clay, with a small percentage of sand. There are, however, strata of sand overlaid and underlaid with clay that should be well mixed during construction. The material, when properly placed in the levee, will well serve its purpose.

STATISTICS.

Acreage.—Kaskaskia Island contains nearly 14,000 acres, of which about 3,500 acres, or one-fourth, is not cultivated. Of this 3,500 acres, fully three-fourths has been uncultivated on account of overflows, which average every other year.

Elevations.—The highest points on the island are 389 feet on the Memphis datum, the surface falling toward the southeast. During high water of 1912 only a few hundred acres were not flooded.

Crops.—Special attention is called to the difference in the amount of wheat for the years 1912 and 1913. There was an overflow in 1912.

	1912	1913
Wheat.....bushels..	30,980	108,340
Wheat.....do.....	123,300	(1)
Potatoes.....do.....		783
Peas.....do.....		3,205
Winter seed.....do.....		66
Alfalfa.....do.....		17
Winter hay.....tons..		171
Timothy hay.....do.....		185
Orchard.....do.....		77
Domestic corn.....do.....		16
Apples.....do.....		1
Apples (fancy, at \$2.25).....head		613
Apples (common, at \$1.90).....barrels..		576
.....do.....		108

¹ Too early to report.

Population.—The following table of the vote of the island on presidential elections shows a steady decline in population. This decrease is occurring in the section subject to the greatest overflows.

Total vote:

1900.....	235
1904.....	188
1908.....	185
1912.....	155

Schools and churches.—Kaskaskia is divided into two school districts, having three schools of two rooms each. The one in Kaskaskia is brick, with a large auditorium. We could not get a report on the school census, but there has been a falling off here. There is a large brick Catholic Church and brick parsonage, and a frame Baptist Church.

CONCLUSION.

If this land were properly protected, so the farmers were sure of harvesting their crops without loss by floods, a great many improvements would be made and more intensive farming would be indulged in, more and better machinery used, and more substantial improvements would be made. A greater part of the product of the island is shipped by boat, and it is urged that every effort be made to obtain improvements in the navigable channel for river transportation, and also the protection of the banks from erosion, as well as the construction of levees to prevent overflow.

Respectfully submitted.

Approved:

W. A. THOMPSON,
Chief Engineer.

T. N. JACOB,
Consulting Engineer.





To accompany report of Mississippi River Commission
Dated December 19, 1913

MISSISSIPPI RIVER CO.

TO THE

UPPER ALLUVIAL VA

OF THE

MISSISSIPPI R

SHOWING MILEAGE LEVER AND DE

BETWEEN CAPE GIRARDEAU, MO, A

IN TWO SHEET

SHEET NO.

PREPARED UNDER THE

THE SECRETARY MISSISSIPPI R

NOVEMBER 191

GEORGE W. MILES

MISSISSIPPI RIVER CO.

To accompany report to Missouri
State Geologist



MISSISSIPPI RIVER COMMISSION
PART OF
UPPER ALLUVIAL VALLEY MAP
OF THE
MISSISSIPPI RIVER
SHOWING MILEAGE, LEVEE AND DRAINAGE DISTRICTS
BETWEEN CAPE GIRARDEAU, MO. AND ROCK ISLAND, ILL.
IN TWO SHEETS
SHEET No. 2
PREPARED UNDER THE DIRECTION OF
THE SECRETARY MISSISSIPPI RIVER COMMISSION
NOVEMBER 1913

SCALE OF MILES
5 4 3 2 1 0 10 20 25

To accompany report of Mississippi River Commission
Dated December 19, 1913



MISSISSIPPI RIVER COMMISSION
PROFILE OF MISSISSIPPI RIVER
FROM CAIRO, ILL. TO ROCK ISLAND, ILL.
SHOWING ELEVATION OF BANKS, HIGH WATER SLOPES
TO WHICH LEAVES ARE REFERRED AND LIMITS
OF LEVEE AND DRAINAGE DISTRICTS

MADE UNDER THE DIRECTION OF
THE SECRETARY OF WAR, BY THE COM. JOHN
REYNOLDS, 1885.
APPROVED MAY 4, 1885.
HORIZONTAL SCALE 1 INCH = 20 MILES
VERTICAL SCALE 1 INCH = 10 FEET
NOTE:
The profile was made by the U.S. Army, and is the best
available. It is a copy of the original, and is not
a reproduction of the original.



